COAL AGE

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DEVOTED TO THE OPERATING, TECHNICAL AND BUSINESS PROBLEMS OF THE COAL-MINING INDUSTRY

SYDNEY A. HALE, *Editor*

New York, December, 1933

Progress

IN A YEAR when overcautious captains of industry sought safety in inaction and turned thumbs down on many meritorious projects for improvement and development, courageous leaders in coal mining have continued to take a forward-looking view and to back their vision with their dollars. Although, naturally, these developments are below the rate of boom periods, modernization programs have not been cast into the discard; many have been completed, many are under way and still more are in the formative stages.

No more striking demonstration of the faith these men have in the future of their industry can be found than the new mines which have been brought into production this year—not by amateurs but by seasoned veterans with a background of successful operation. Because the times are so unusual, it seemed particularly appropriate that *Coal Age* in 1933 should feature these developments in lieu of the customary Annual Model Mining Numbers which have been published since 1921. The present issue, therefore, is largely given over to the story of two of these new properties—Indian Head, in the anthracite region, and Middle Grove, in the bituminous field.

Teeth

ANNOUNCEMENT that NRA would invoke the penal provisions of the law against wilful violations of codes and agreements has unloosed a suspicious flood of protests bewailing this proposal to destroy "the purely voluntary basis" upon which the new self-government in business has been established. But not from the coal industry. Responsible leaders in this industry know that more than moral suasion is needed to induce the persistent chiseler in prices and in wages to abandon practices which have threatened the very existence of those elements in business that desire to play the game fairly and squarely. Opposition to enforcement is not in their minds; on the contrary, they will welcome governmental action to compel strict and impartial adherence to the rules laid down.

Bigger Than Industry

HOW FAR the nation is from forehanded solution of the social problems arising out of changing market trends was shown again in the anthracite code hearing before NRA in November. Faced with a steadily declining market, operators have tried to stimulate buying by reducing prices and, to make these reductions less insupportable, have concentrated production at lower-cost mines. Striking blindly at results, and without apparent analysis of causes, workers thereby deprived of their regular employment and communities dependent upon the purchasing power of these men for community survival join in a demand that producers be compelled to operate all collieries they control an equal number of days and to curtail or abandon other economy measures.

Equalization, without regard to demands for shorter hours and with no changes in base day rates, would add approximately 50 cents per ton to the over-all cost of the total production of the region. Obviously an industry which has been losing millions of dollars in recent months cannot absorb the additional costs which would

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be imposed. To attempt to pass them to the consumer would mean only further shrinkage in markets and increasing unemployment. The consumer may express an academic sympathy for the plight of these workers, but it would take more than simple optimism to believe that he is so socially minded that he would gladly pay the increase that equalization might be adopted—at least not while purveyors of competitive fuels are whispering that he can reduce even his present costs by buying their product.

Operators would gladly run every mine full time if consumer demand would take the output. They, no less than the complaining workers and communities, are victims of changing market trends. To take steps which would accelerate the trend away from anthracite would be neither profitable nor socially desirable. Their efforts must be directed toward winning back lost tonnages—and higher prices would not help.

Company Stores

ATTEMPTS of independent retail associations to outlaw the use of scrip and curtail the credit extension policies of industrial or company stores receive only conditional sanction in the Code of Fair Competition for the Retail Trade approved by the President October 21. The effective date of these particular provisions has been postponed until July 1, 1934. In the meantime, General Johnson is to appoint a committee of three to study the question and make recommendations which, if approved, will be substituted for the present postponed provisions.

Under the terms of the code, the committee is "to investigate the economic and social implications of these provisions." Such an investigation conducted with these objectives in view ought to do much to clarify public understanding of a system which has had little impartial examination. Those familiar with company-store operation in the coal-mining industry—including not a few critics who have publicized abuses for partisan purposes—know that the system when properly directed fills a definite economic and social need.

Survival of the company-store system should rest solely upon that basis. The industry can ask for nothing more; it should be satisfied with nothing less. To countenance the destruction of a system rendering a real community service at the behest of jealous competitors striking behind a screen of fair trade practices would be to connive at a flagrant perversion of the spirit of the act.

The Four C's

FOUR CARDINAL CONSIDERATIONS dominate the householder in his choice of fuel—cost, comfort, convenience and cleanliness. For the most part, the coal industry is on equal or better footing than its rivals in satisfying the consumer's demand for a fuel which will be reasonably priced from the standpoint of absolute price and relative efficiency. Coal also has no cause to give ground on the score of comfort.

When it comes to convenience and cleanliness, however, too many coal producers still fail to take advantage of all the weapons which engineering skill and science offer. Too many have resisted, rather than encouraged, the development and growth of mechanized heating with coal to match the convenience of oil and gas. While millions have been spent—and wisely, too—in improving preparation, far, far too many operators have stopped short of the final treatment which would give the consumer a dust-free, as well as a chemically clean, product.

And yet this last step may determine whether the consumer sticks to coal or slips away to a rival fuel. These rivals have made him highly conscious of the appeal of cleanliness. To ignore this fact is to invite increasing losses of profitable tonnage.

Red Signals

THE MEASURE of success which the bituminous code achieves in maintaining and in increasing employment at reasonable wages in the mining industry will be dependent upon what is done by the national administration to put oil and gas into proper competitive relationships with coal. Outcries of New England industrialists who threaten to turn to oil because the code has ended their purchase of coal at starvation prices, and the action of Swift & Co. at Chicago in changing from coal to natural gas give impelling warning that prompt action is imperative. Washington cannot close its eyes to such danger signals without becoming responsible for a tragic travesty on the high purposes of NIRA.

ENGINEERING FORETHOUGHT

+ Fits Operations at New Indian Head Plant

To Both Present and Future Demands

IN COAL MINING, as in any other field of activity, the development of new producing facilities is predicated on the expectation of a profit. Realization of a profit, however, is not a feat of magic but is dependent on two basic fundamentals: (1) ability to ship a product that will meet the requirements of the available market and (2) ability to produce at a cost which will assure an adequate spread between total cost and sales realization. A property that can satisfy these major requirements is a property that normally will return a reasonable profit, and it was with this premise in mind that the new Indian Head colliery of Indian Head Anthracite, Inc., was opened in the southern anthracite field this year.

Equipped to ship a maximum of approximately 1,200 tons of washed coal and to handle up to 1,600-1,700 tons of raw feed per shift of eight hours, the Indian Head colliery was designed not only for the greatest possible flexibility under present operating and marketing conditions but also to facilitate any changes which may be necessary in the future. This flexibility extends to preparation and shipping facilities, raw-coal sources, mining methods and power and water supply as well as other activities entering into mining, preparation and shipping. The colliery eventually will draw all its coal from a 2,000-acre tract near Tremont, Pa., leased from the trustees of Calvin Pardee, this acreage extending along the main Short Mountain basin and across the Red Mountain, or Gate Ridge, Big Lick and Newtown anticlines. The operation is served by the Middle Creek Branch of the Reading Co. and a state highway affords a direct outlet for truck shipments to all consuming points within reasonable hauling distance.

Previous operations on the Indian Head tract were confined to the Everts tunnel in the Red Mountain anticline (abandoned during the Civil War) and the Marshfield slope works. The Everts tunnel has been reopened, but with this exception the major part of the production will come from new workings reached by a slope sunk in the Big Lick anticline near the north end of the property. The preparation plant also is located at this point, and for about two years to come will handle coal from four sources, as follows: Everts tunnel (brought in by railroad); No. 1 slope; strippings along the Big Lick anticline; and raw coal shipped in by railroad from the Sherman colliery of the Sherman Coal Corporation, Pottsville, Pa., which is controlled by the same interests. Operations at the Sherman colliery are expected to cease not later than 1936, and when this occurs, the Indian Head plant will be handling coal from No. 1 slope, Everts tunnel and the stripping operations in approximately the following proportions: No. 1 slope, 60 per cent; Everts tunnel, 15 per cent; strippings, 25 per cent. After about 1936, however, stripping will taper off sharply and probably will end entirely four or five years later.

As may be seen from the analysis just above, the principal production in the future will come from the No. 1 slope workings. This slope, however, eventually will be replaced by a shaft or a second slope to be located on the opposite side of the headhouse from the present opening, as it is expected that only two levels will be mined with the present set-up. The slope is driven 13 ft. wide and 7 ft. high on a pitch of 30 deg., this width allowing the installation of two tracks for hoisting coal in balance. Length of the slope from the surface to the first level is 420 ft., and

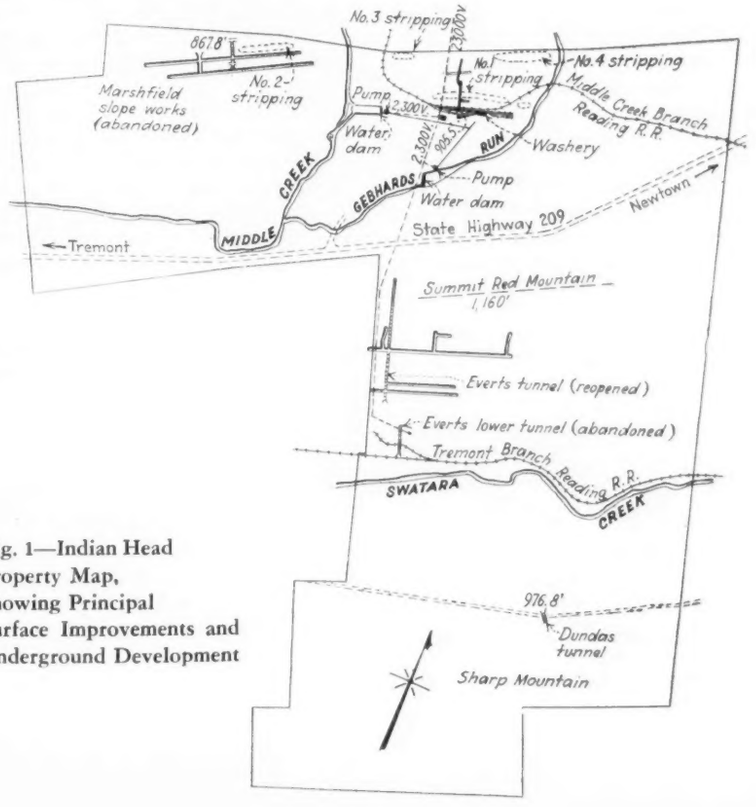


Fig. 1—Indian Head Property Map, Showing Principal Surface Improvements and Underground Development

from the surface to the dumping point in the headhouse the two tracks are carried on an incline 110 ft. long on the same pitch as the slope itself.

In developing the territory to be worked from No. 1 slope, the plan calls for driving rock tunnels 10 ft. wide and 7 ft. high across the measures to cut the various veins. One tunnel is now driven on a grade of 0.5 per cent in favor of the water. These tunnels serve as the haulage roads from the various veins, and eventually will extend both north and south from their respective slope landings. The tunnel work at No. 1 slope is contracted to Hugh Dolan & Sons, Pottsville, Pa., who also sank the slope.

Mining in the various veins is carried on from gangways turned off to the right and left of the tunnels. Like the rock tunnels, the gangways are driven on a grade of 0.5 per cent in favor of the water, and are paralleled with monkey headings which serve as return airways with a clear area of 36 sq.ft. The dimensions of the gangways are adjusted to accommodate the standard timber set of two legs and a collar, shown in Fig. 2. This figure also shows the relative positions of the gangway and monkey heading.

Present plans are based on use of the chamber-and-pillar system of mining with batteries. The vertical distance between levels will be adjusted so that the length of the chambers will be as near as possible to 250-260 ft. and the mining system calls for driving chambers on 55-ft. centers and robbing the pillars as the gangway advances. On 55-ft. centers, the width of the chambers is approximately 24 ft., leaving a 31-ft. pillar. Both chamber centers and chamber widths, however, are subject to reduction in case conditions in any particular section justify it.

On the first level at No. 1 slope, due to the fact that the distance to the surface is approximately 400 ft., the management has under consideration a plan for sectionalizing the veins where this condition prevails. Each section has been assigned a tentative length of 600 ft., as measured along the gangway, and will be developed by a chute driven up the center. From this chute, it is proposed that a pair of counters be turned from the chute midway between the gangway and the surface, one counter running to the right and the other to the left. Shaker conveyors will be used to drive these counters, according to present plans, and from them chambers will be driven up to surface, starting from the outer ends of the counters. Coal from the chambers and accompanying pillar-robbing operations will be transported to the chutes by means of the conveyors. When extraction of the coal above the pair of counters is completed the vein below the counters will be removed by the chamber-and-pillar method, thus completing operations in a particular section.

The coal is blasted with duPont No. 9A, L.F., permissible coal powder, and while gas has not yet been discovered, the mine is operated with Wolf safety lamps and Edison electric cap lamps, the latter being largely the new Model K. Underground men are required to wear safety headgear, the company leaving up to the individual the choice of the type.

Operations at the Everts tunnel workings will be substantially similar to those at No. 1 slope, though in this case each level below the tunnel probably will be served by its own slope. As the interval between veins at both Everts tunnel and No. 1 slope generally is in excess of 100 ft., it is possible to operate each one separately without columnization or correlation of operations as between veins.

When development reaches the proper stage, underground transportation at No. 1 slope will be electrified with trolley locomotives. The Everts tunnel workings, however, will be operated with mules throughout their life, according to present plans. Haulage tracks are laid with 35-lb. rail on a gage of 36 in., and the cars are equipped with Timken roller bearings. At the No. 1 slope, the

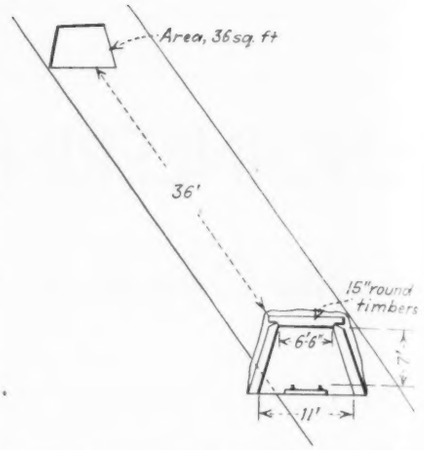


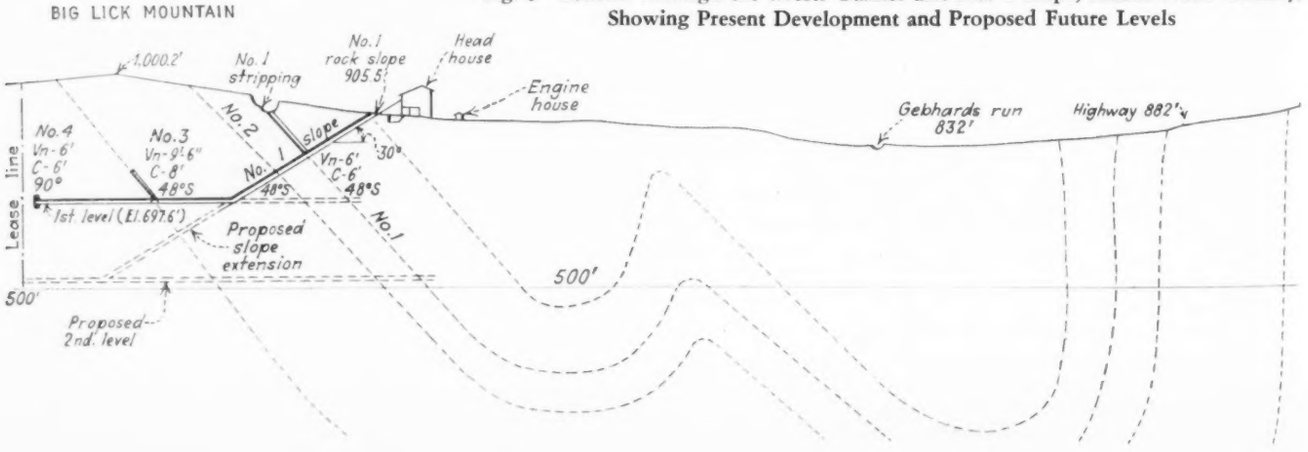
Fig. 2—Gangway Timbering Plan, Showing Position of Monkey Heading

cars will be dumped underground by means of a rotary dump.

The plan of the bottom on the first level at No. 1 slope, shown in Fig. 4, provides for a double-tracked turnout in the No. 3 vein, the gangway at this point being widened to accommodate both roadways. From the turnout the two tracks will be carried in the southward extension of the rock tunnel to a point approximately 300 ft. from the dump, with crossovers every 100 ft. between the dumping and passing tracks. From the dump the coal will flow through a chute to the gunboat on the track in the slope extension.

One feature of the hoisting arrangements at the No. 1 slope is the use of aluminum alloys in the 160-cu.ft. gunboats, now being built by the American Car & Foundry Co. The alloys are confined largely to the construction of the body, the running gear and other parts subject to heavy stresses or shock being made of steel. Wheels are equipped with Timken bearings. Weight of a single gunboat is 4,950 lb., a reduction of 3,000 lb. from the total for an all-steel installation. The consequent reductions in acceleration stress, rope size and power requirements were the major factors in inducing the management to

Fig. 3—Section Through the Everts Tunnel and No. 1 Slope, Indian Head Colliery, Showing Present Development and Proposed Future Levels



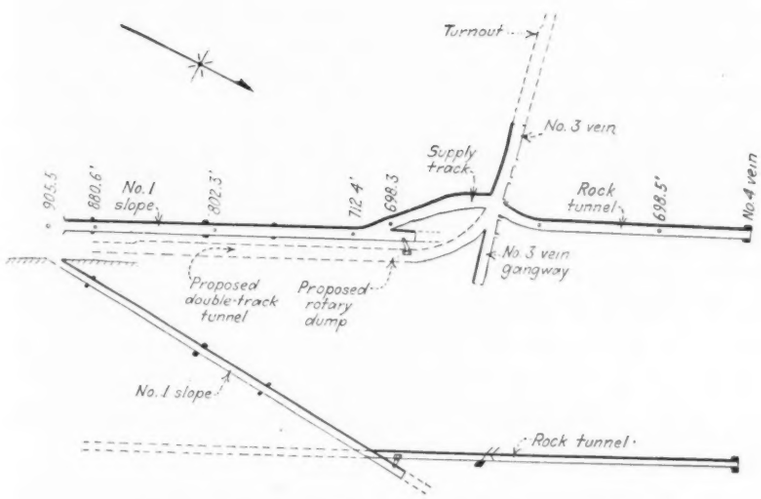


Fig. 4—Plan of Bottom, First Level, No. 1 Slope

specify the use of aluminum alloys.

At the present time, the mine cars are equipped with special bridles to allow them to be brought to the surface for dumping. The 100-hp. single-drum Vulcan hoist now employed in this service will be replaced in the future with a double-drum hoist—probably 300-hp.—when the gunboats are installed.

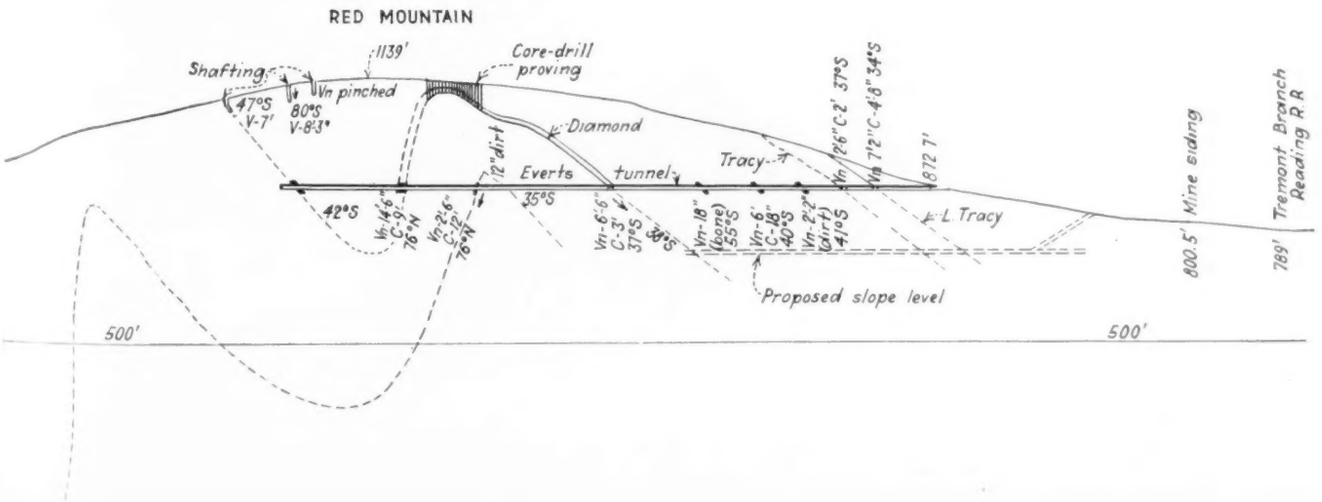
At the Everts tunnel, the mine cars are hauled to the outside and dumped over a horn dump, the coal being transported from the dumping point to the railroad car on a 115-ft. Vulcan shaking conveyor driven by a 10-hp. motor. The gradient is 4 per cent in favor of the coal. When operations begin on the lower levels, however, a hoist will be installed to bring the cars up the slope to the surface, and the dumping station will be elevated so that the coal will flow direct from the dump into the railroad cars.

Drainage work in the slope levels at the Indian Head colliery is based on conducting the water through ditches on the haulage roads to sumps near the slope landings. Everts tunnel, however, will drain directly to the outside. As an example of the general plan of handling water where drainage direct to the outside is not available, a sump will be located south of the first level landing at No. 1 slope, probably in the No. 2 vein, to which all the water from the tunnels and gangways on this level will be drained. Plans call for the construction of a long, narrow sump with a capacity of 500,000 gal. partly in the vein and partly in the rock. Width and depth will be, respectively, 11-12 ft. and 8 ft., and centrifugal pumps will be employed to raise the water to the surface through discharge lines laid in the slope. Pump installation practice calls for suction heads not in excess of 16 ft., and the company, where possible, sets the pumps 6 to 8 ft. above the top of the sump, so that in case of an emergency the gangways in the neighborhood of the installation will accommodate a large overflow before the pump is flooded.

As indicated above, the Indian Head surface plant is concentrated at the No. 1 slope, with the exception of the necessary coal-handling and power facilities at Everts tunnel. The No. 1 slope plant, after completion of the construction program, will consist, therefore, of the colliery office building, including the truck-weighing station, supply room, first-aid station and lamp room, in which is also located the compressor, a.c. switchboard and d.c. substation; colliery transformer station (adjoining the office building); preparation plant, including the headhouse and washery; railroad yard; blacksmith and car-repair shop; hoist house; coal inspector's laboratory; and two water-supply dams with their accompanying pumping stations. In planning the surface improvements, careful attention was given to their relation with highway and railroad connections and future underground development, the final layout being the joint work of Edgar O. Marty, president, and W. C. Schott, mining engineer, with consulting service by Paul Sterling, mechanical engineer, Lehigh Valley Coal Co.

The preparation plant and preparation methods are described in a separate article on pp. 401-404 of this issue. Yard facilities consist of one passing track, three empty tracks above the washery loading station, including the mine-run track, and three loaded tracks below the washery. The empty tracks are laid on a grade of 1.65 per cent, which is increased to 2 per cent under the washed-coal pockets. Below the washery, the grade varies from 1.75 per cent to flat.

An ample supply of water for the operation of the washery has been assured by the construction of two 3,500,000-gal. water dams, one fed by Middle Creek and the other across Gebhards Run, a branch of Middle Creek. The Middle Creek dam is relied upon for the main washery supply, and is equipped with a 1,500-g.p.m. Barrett-Haentjens centrifugal pump with suction-line primer driven by a 75-hp., 2,300-volt, Westinghouse, Type CS line-start motor. The pump operates against a 175-ft. head, and the station is connected with the washery by 1,200 ft. of 12-in. "Universal" cast-iron pipe. The Gebhards Run dam represents the emergency water supply, and the pumping station includes a 500-g.p.m. Bar-



rett-Haentjens pump with suction-line primer driven by a 40-hp., 2,300-volt, Type CS motor. Pumping head is 200 ft., and the supply line consists of 900 ft. of 8-in. "Universal" pipe.

Electric power is received from the lines of the Pennsylvania Power & Light Co. at 23,000 volts at the transformer station adjacent to the colliery office. This transformer station was designed for the colliery by the General Electric Co., and at present is equipped with two parallel banks of three Type H, 60-cycle, 200-kva., tertiary-wound, 23,000/2,300/-

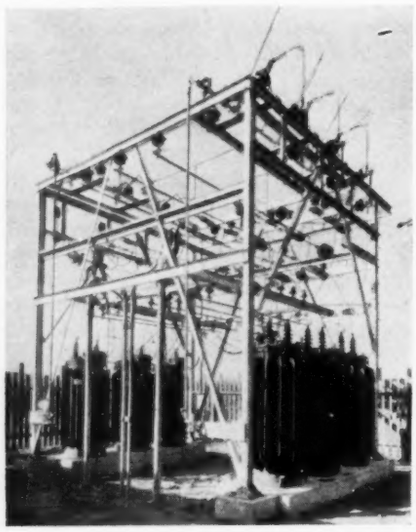


Fig. 5—Transformer Station at Indian Head Colliery

440-volt transformers each. Each transformer has a rating of 125 kva. on either 2,300 or 440 volts, the remaining 75 kva. being available for the other of the two voltages. The station is arranged so that either or both banks can be in service at the same time, the standard schedule calling for operation of both banks during the day and one bank on the off shifts. Provision also has been made for the installation of an additional bank of three transformers to take care of the underground load when the rate of operation necessitates the addition of converting equipment.

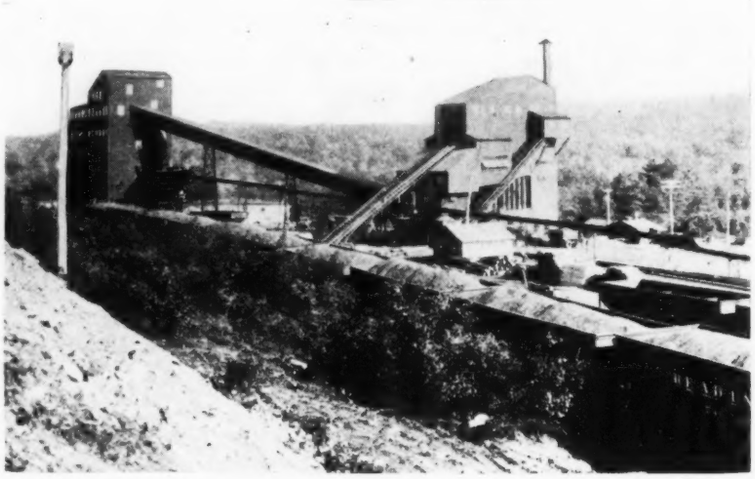
Each bank of transformers is connected to incoming feeder panels on the switchboard in the lamp room by cables carried in conduit. Four secondary distribution panels are installed, two for 2,300 volts and two for 440 volts, all protected by oil switches. These panels feed onto overhead buses, from which connections are made to the outgoing feeder panels, of which there are four for the 440-volt circuits and two for the 2,300-volt circuits, all protected by oil circuit breakers. The four 440-volt panels control the following circuits: headhouse, washery, No. 1 slope feeder and miscellaneous applications. One of the two 2,300-volt circuits, with branches to the two washery-water-supply pumps, extends to the Everts tunnel transformer station, which at present is equipped with three 37½-kva., 2,300/440-volt transformers. The other circuit serves the compressor motor. All outgoing feeder lines leave the switchboard in overhead conduit. Additional panels will be installed later to take care of the direct-current requirements of the No. 1 slope.

Compressed air for No. 1 slope is now supplied by one-half of a Sullivan Class WN4 angle-compound compressor with a capacity of 757 cu.ft. of free air per minute at a working pressure of 100 lb. The compressor is driven by a General Electric, Type TS, Form A, Frame 6304D, 250-hp., 0.8-leading power factor, 2,300-volt synchronous motor operating at 327 r.p.m., with separate exciter and full-voltage automatic starting panel. This motor also will drive the second half of the compressor unit, which will be installed when plant air requirements justify it. In addition to its primary function of driving the compressor the motor also serves as an agent for improving power factor. Due to its installation and care in the selection and installation of motors and drives, plant power factor averages 92 per cent.

Stripping operations at present are being carried on at four pits near the No. 1 slope, coal being loaded from two and overburden being stripped at the others. This work is done under contract by J. Robert Bazley, Inc., and plans call for a relatively large output from this source for the next two or three years, and for a lesser quantity in the succeeding four or five years, by which time it is expected that all available outcrops adaptable to this type of mining will have been exhausted.

As the veins at the No. 1 slope workings pitch sharply from the surface, stripping operations are confined to following them down until the depth makes further activity inadvisable. Draglines generally are employed for removing the "overburden," and both draglines and shovels are used in loading the coal, which is hauled to the dumping point at the headhouse in trucks. On their way to the dump, the trucks are weighed on 30-ton Howe scales equipped with the "Weightograph." These scales are used also in weighing truck shipments.

Fig. 6—Stripping and Loading Coal at Indian Head Colliery. Dragline on Top of Bank at Right Is Removing Overburden, Other Machines Working in Coal

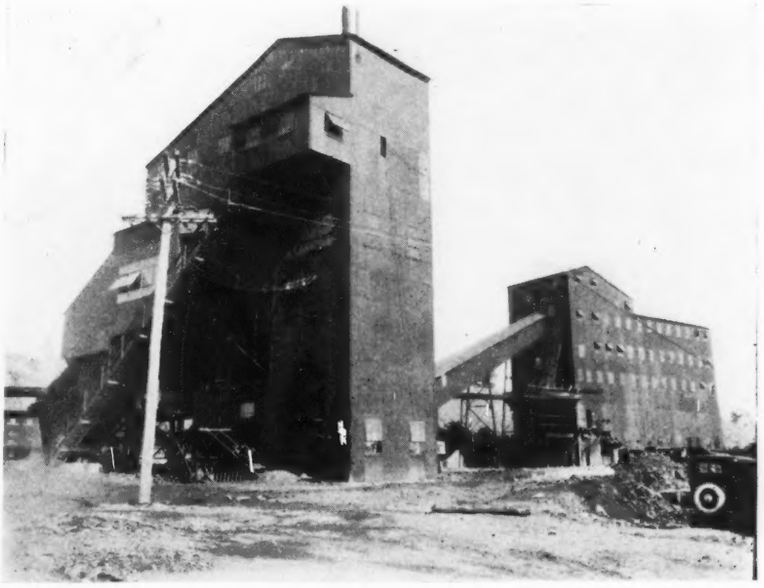


Indian Head Surface Plant, Showing Incline From Slope Opening

FLEXIBILITY THE OBJECTIVE

+ In Design of Preparation Plant

At New Indian Head Colliery



Indian Head Preparation Plant, Showing Headhouse, Conveyor Gallery and Washery. Railroad Cars and Trucks Dump at the Foot of the Conveyor (Lower Left)

IN KEEPING with the general principles which guided the development of the entire operation, the preparation plant at the new Indian Head colliery of Indian Head Anthracite, Inc., Tremont, Pa., was designed to permit maximum flexibility in preparing and shipping a product tailored to meet the demands of the market. With both highway and railroad connections available for distribution, the plant is equipped to produce regularly 850 tons and a maximum of 1,200 tons of washed and sized coal per shift of eight hours and to handle up to 1,600-1,700 tons of raw feed from various sources.

The entire plant is made up of two units—the headhouse and the washery—connected by a belt-conveyor gallery. The preliminary steps in preparation—hand-picking to remove heavy refuse and crushing—take place in the headhouse, after which the raw coal goes to the second unit to be washed, sized and run to the loading pockets. As mentioned in the previous article on the Indian Head property (pp. 397-400 of this issue), the headhouse is designed to receive coal from four different sources: No. 1 slope, Everts tunnel, stripping operations, and the Sherman colliery of the Sherman Coal Corporation, Pottsville, Pa., controlled by the same interests.

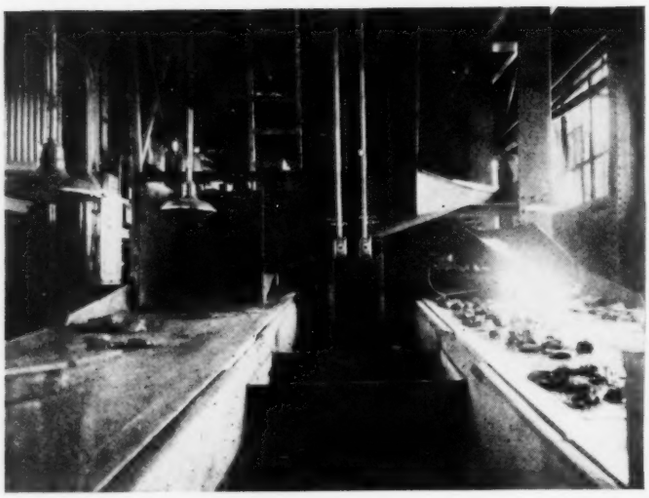
Coal from the No. 1 slope is hoisted directly to the dumping point in the top of the headhouse, the slope headframe being incorporated into the headhouse structure. Coal from both Everts tunnel and the Sherman colliery is shipped in by railroad and is dumped into a bin at the foot of the 36x10-in. chain-and-flight conveyor on a 37-deg. pitch leading up to the head of the bull shakers. Trucks carrying raw coal from the strip pits also dump into this same hopper after being weighed on 30-ton Howe scales equipped with "Weightograph." Both the Everts tunnel and the truck coal comes in in the "as-mined" state, but shipments from the Sherman operation are first hand-picked to remove heavy rock and then are crushed to egg size.

As the first step in the preparation process, the coal is passed over triple-deck bull shakers. Lump coal from the top deck ($4\frac{3}{4}$-in. round perforations) discharges onto one 4x17½-ft. shaking picking table, while steamboat ($4\frac{3}{4}$x$3\frac{7}{8}$-in.) and broken ($3\frac{7}{8}$x$3\frac{1}{8}$) go to a second 5x17½-ft. picking table, which is divided by a ridge in the middle to keep the two sizes segregated. Material below $3\frac{1}{8}$ in. is lowered directly to the raw-coal bin at the foot of the belt conveyor. Refuse removed on the picking table is dropped directly into the rock bin underneath the tables, and the coal goes to two Wilmot 36x34-in. compound-geared crushers equipped with manganese-steel segments and cast-steel gears and sole plates. One crusher handles the lump and the other the steamboat and broken.

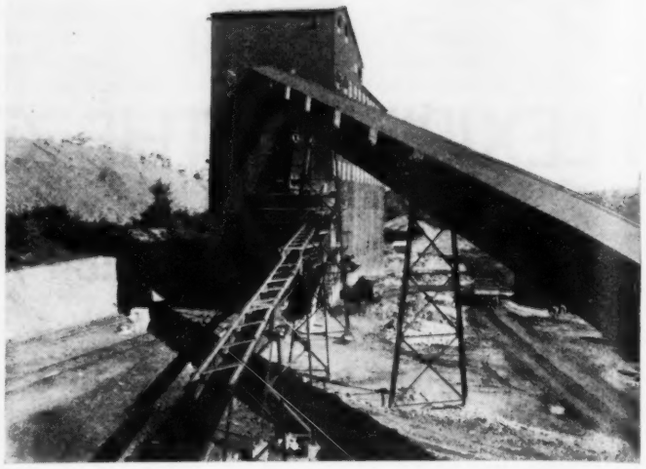
Both crushers, in accordance with latest crushing practice, are set to make not over 20 per cent of oversize, thus increasing the yield of prepared sizes and avoiding the difficulties growing out of adjustment of screens and roll settings necessary when crushing to exact size in one pass is practiced. Also, flats are kept in circulation until they are finally broken down. From the crushers, the raw coal is chuted to the mine-run conveyor and again passes over the bull shakers, where the oversize is screened out for further crushing. A third 24x24-in. crusher also has been installed in the headhouse for use in case it becomes necessary to break down egg in the future.

From the receiving bin in the headhouse the raw coal is transported to the washery on a 24-in. 5-ply Manhattan belt with ⅛- and $\frac{1}{32}$-in. rubber covers. This belt, 225 ft. between centers, operates at a speed of 335 ft. per minute and has a capacity of 225 tons per hour. It is carried on Sprout-Waldron roller-bearing idlers with Alemite fittings, troughing idlers being spaced 4½ ft. apart and return idlers 12 ft. apart. Inclination of the conveyor is 14 deg.

The belt conveyor discharges directly



Shaking Picking Tables in the Headhouse; Left, Lump Table; Right, Divided Table for Handling Steamboat and Broken Sizes



Washery and Conveyor Gallery at Indian Head, Showing Fine-Coal Boot, Waste-Water Sluiceway and Refuse-Loading Station

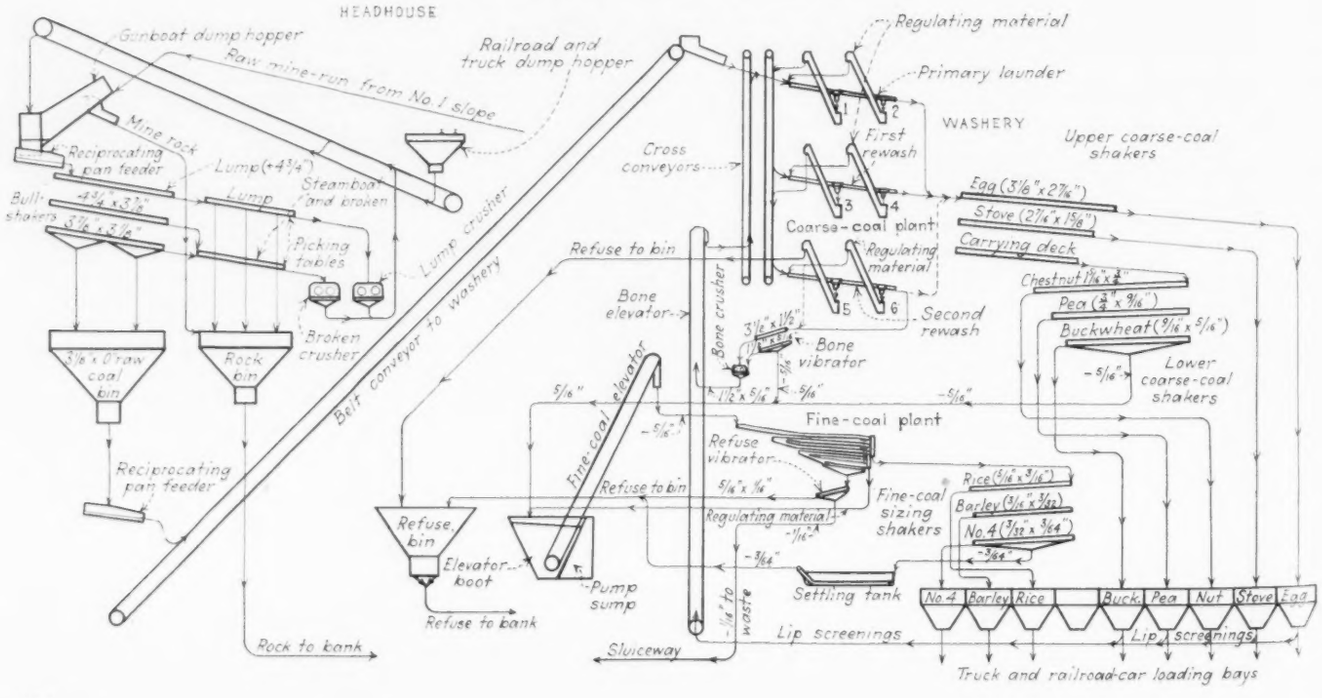
into a unit-type Rheolaveur washer made up of primary, first rewash and second rewash launders and the necessary elevators and cross-conveyors. Each of the three launders is equipped with two Rheo boxes, the material removed from the first box on the primary launder going to the rewash launder and the material from the first box on this launder going to the final rewash launder. Material from the first box on the final rewash launder is chuted to the refuse bin. The product of the second boxes on each of the three launders is returned to the respective launder feeds to serve as a regulating medium.

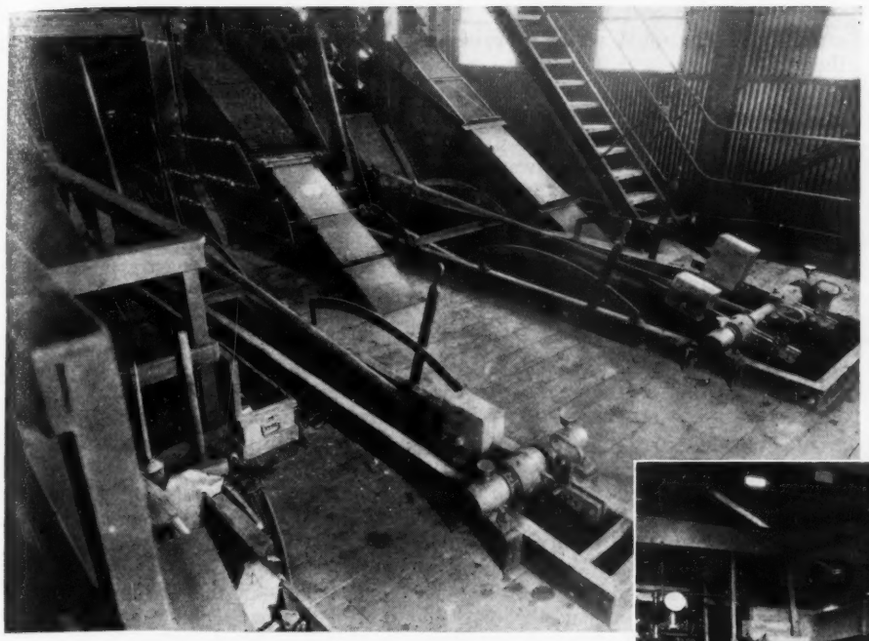
Washed coal discharged from the ends of the primary and first rewash launders goes to the coarse-coal sizing shakers, while the product of the final rewash launder is chuted to a bone vibrating screen, where it is separated into three sizes: 3½x1½ in., 1½x$\frac{7}{16}$ in., and resultant. The latter (minus $\frac{7}{16}$ in.) goes to the fine-coal boot which supplies the fine-coal plant, while the 3½x1½-in. product is broken down to 1½ in. in a Wilmot 18x18-in. high-speed crusher and elevated to the primary launder feed along with the 1½x$\frac{7}{16}$-in. material from the second deck of the bone vibrator.

Washed coal from the primary and first rewash launder is screened into five major sizes and one resultant on two sets of Parrish-type flexible-arm coarse-coal shakers each with three decks. The top deck of the upper set (5x24 ft.) is equipped with steel plate having 2$\frac{7}{16}$-in. round perforations for producing 3⅛x2$\frac{7}{16}$-in. egg. Similar equipment on the second deck (5½x15 ft.) provides for screening out 2$\frac{7}{16}$x1⅝-in. stove. The third, or carrying, deck, is equipped with blank plate, and discharges onto the lower shakers inclined in the opposite direction. Sizes made on the lower shakers (6x18, 6½x21 and 7x21-ft. decks) are as follows: chestnut, 1⅝x¾ in.; pea, ¾x$\frac{9}{16}$ in.; buckwheat, $\frac{9}{16}$x$\frac{5}{16}$ in. The minus $\frac{5}{16}$-in. material through the lower deck is sluiced to the fine-coal boot.

The feed to the Rheolaveur fine-coal plant therefore consists of the minus $\frac{5}{16}$-in. bone from the final rewash launder in the coarse-coal plant

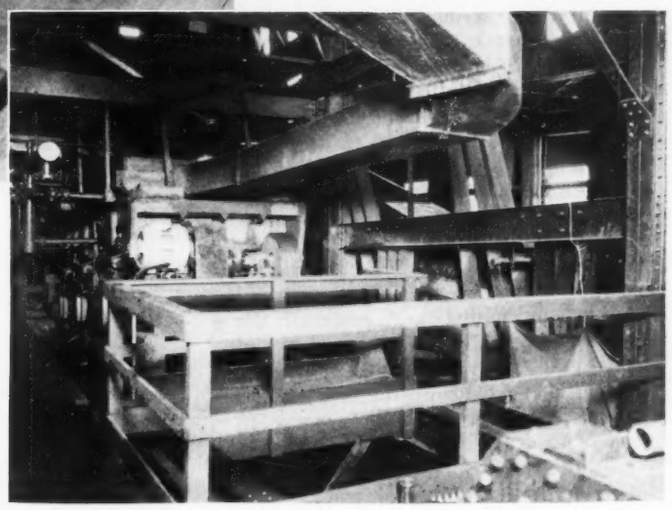
Flowsheet, Indian Head Preparation Plant



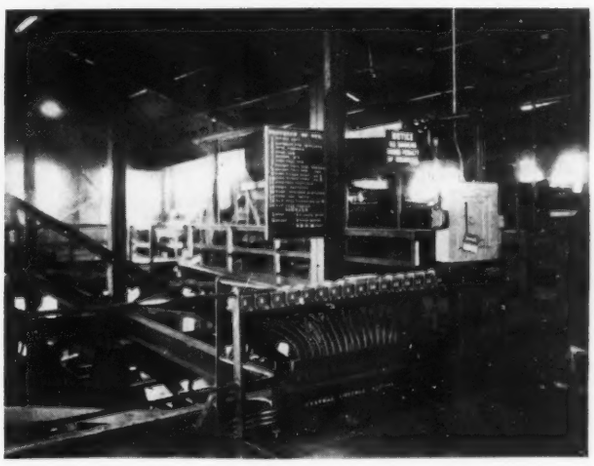


Coarse-Coal Washer; Primary and First Rewash Launders on the Right, Final Rewash Launder on the Left

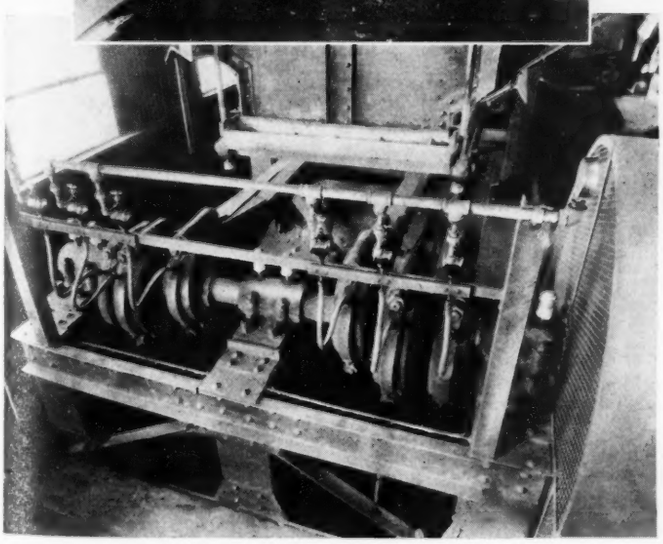
High - Speed, Short - Stroke Fine-Coal Shakers on the Left, Coarse-Coal Shakers on the Right



Raw-Coal Belt Conveyor Between Headhouse and Washery



Pushbutton Control Station on the Coarse-Coal Washer Platform



Bull Shaker Drive With Forced-Feed Oiling Connections

plus the minus ¼-in. resultant from the coarse-coal shakers, all of which is collected in the fine-coal boot. From the boot it is elevated to the head of the upper launder of the fine-coal unit, which makes three products: cleaned coal (sluiced to the fine-coal shakers), regulating material (returned to the fine-coal boot), and refuse.

The fine-coal shakers consist of a Koppers-Rheolaveur short-stroke high-speed unit with a Reeves variable-speed drive for varying the operating speed to meet the required specifications for oversize and undersize. This shaker, which has a 1⅛-in. throw, now operates at 325 strokes per minute and is equipped with manganese-bronze and Ascoloy screen plates to produce the following sizes: rice, ⅜x⅜ in.; barley, ⅜x⅝ in.; No. 4 buckwheat, ⅝x¾ in.; and a minus ¾-in. resultant. The latter is sluiced to a settling tank 6 ft. wide, 6 ft. deep and 40 ft. long. The fine coal settling to the bottom of the tank is removed by a chain-and-flight conveyor and discharged into the refuse bin. Refuse from the fine-coal plant is chuted to a vibrating screen, where it is separated into plus and minus ¼-in. material, the former going to the refuse pocket and the latter to the waste-water flume.

Sized coal from both the coarse- and fine-coal shakers flows by gravity to pockets underneath the washery equipped with lip screens and chutes for loading either railroad cars or trucks. Lip screenings are sluiced to the bone elevator boot, from which they are elevated to the feed to the primary launder in the coarse-coal plant. During the night shift, lip screenings are discharged into a bin and are rerun the following day. Like the rock pocket in the headhouse, the washed-coal and refuse bins in the washery are constructed of creosoted wood to prolong their life.

The water supply for both the coarse- and fine-coal plants is pumped to respective constant-head tanks by two pumps. One 2,750-g.p.m. chrome-iron-fitted Barrett-Haentjens installation handles water from the fine-coal boot, while the second, a 1,300-g.p.m. bronze-lined pump, circulates the overflow from the 40-ft. settling tank. Clean water for make-up comes from the Middle Creek dam (see previous article in this issue) and enters the system through spray nozzles on the coarse- and fine-coal shakers.

Rock from the headhouse and refuse from the washery are hauled to the dump in a Linn tractor equipped with a 16-cu.yd. dump body. This equipment was selected because of its ability to operate under the difficult physical conditions encountered on the dump and also because of its ability to make its own fill without the use of bulldozers or other material-spreading equipment.

Westinghouse Type CS linestart motors with Class 11200 linestarters are used to drive all equipment in the headhouse and washery, with the exception of the oil pumps on the forced-feed lubrication systems. The motor list, together with the type of transmission equipment employed, is summarized in Table I. Independent full-sequence control systems are employed in both structures, with a signal system from one to the other to permit coordinated operation. Individual "start-stop" push-button stations are installed for stopping each piece of equipment in emergency, and for operating individual machines out of sequence when necessary.

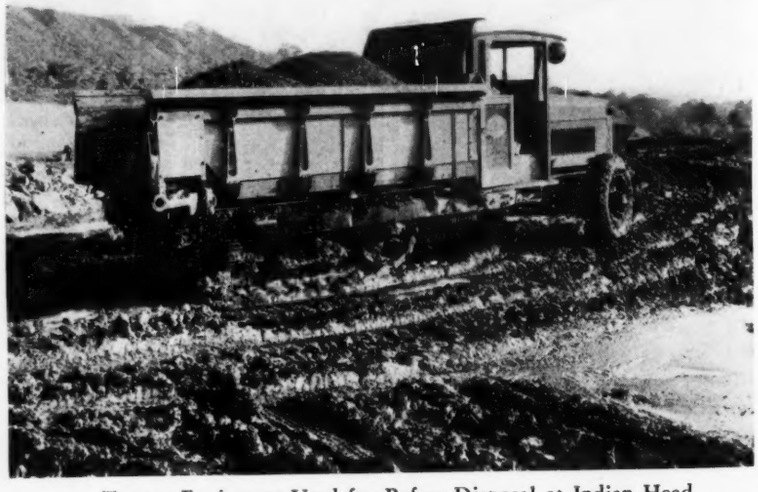
Power transmission equipment consists largely of Goodyear "Emerald-Cord" V-belts and Westinghouse speed reducers, with the exception of the variable-speed drive on the fine-coal shakers, flat belts on the lump and broken crushers, spur-gear secondary and tertiary reductions on one conveyor and one elevator, and Jones reducers on the cross-conveyors and Rheo boxes on the coarse-coal washer. Details are given in Table I. All belt drives, pulleys and similar moving parts are entirely inclosed in guards fabricated to allow easy access for inspection, repairs and replacements.

Drives for the reciprocating equipment (feeders and shakers) consist of spherical-faced eccentrics operating in babbitt-lined straps equipped, with the exception of the fine-coal shakers, for forced-feed oiling. One Bowser unit with filtration equipment is used to lubricate the drives on screens, picking tables and feeders in the headhouse, while a second unit serves the coarse-coal shakers in the washery. Application of this particular type of eccentrics and straps, plus the oiling system, made it possible to reduce the motor size by 5 hp. on the screens and has eliminated much of the heating troubles frequently encountered.

Table I—Motor and Power Transmission Equipment at Indian Head Preparation Plant*

Headhouse:	—Motor— Hp.	R.P.M.	Transmission Equipment
Mine-run conveyor	40	900	Reducer (16:1) and spur gears
Bull shaker and feeder	25	900	V-belts
Lump crusher	25	600	Flat belt
Broken crusher	25	600	Flat belt
Egg crusher	15	900	V-belts
Picking tables	10	900	V-belts
Belt conveyor feeder	5	900	Reducer (11.8:1)
Washery:			
Raw-coal belt conveyor	25	900	Reducer (21:1)
Coarse-coal washer:			
Scraper elevators	25	900	Reducer (46.8:1)
Cross conveyors	5	900	Reducer
Rheo boxes	3	1,200	Reducer (20:1)
Upper coarse-coal shakers	20	900	V-belts
Lower coarse-coal shakers	15	900	V-belts
Bone crusher	15	900	V-belts
Bone vibrator	3	1,200	V-belts
Recirculating bone elevator	7½	900	Reducer (21:1)
Fine-coal elevator	15	900	V-belts, roller chain from intermediate shaft and spur gears
Fine-coal shakers	10	900	Variable-speed drive
Sludge conveyor	5	900	Reducer (31.2:1)
Refuse vibrator	3	1,200	V-belts
Circulating water pumps	50	1,800	Direct-connected
	25	1,800	Direct-connected

*Heat diffusers and oiling systems not included.



Tractor Equipment Used for Refuse-Disposal at Indian Head

The Indian Head plant was designed by the Koppers-Rheolaveur Co. in accordance with a layout developed with company officials, and was built by the Koppers Construction Co. Screens, feeders, picking tables, a part of the elevator equipment and the idlers and supporting structure for the belt conveyor were supplied by the Sprout-Waldron Co. Roofing and siding for the headhouse, conveyor gallery and washery consists of 24-gage "Asbestos Protected-Metal" sheathing furnished by the H. H. Robertson Co. Screen plate was supplied by the Hendricks Mfg. Co. Structural steel was manufactured and supplied by the Ohio Structural Co.

ANTICIPATING THE FUTURE

+ Midland Electric Uses Past as a Guide

In Development of New Stripping Operation

PLANNED and constructed to incorporate the experience of past years in stripping and preparing coal, the new Middle Grove operation of the Midland Electric Coal Corporation, located in northern Fulton County, Illinois, 30 miles west of Peoria, raises the daily capacity of the company to 6,800 tons and moves Midland Electric into the ranks of the leading producers of the country. With both operating and marketing experience at the original Atkinson mine (*Coal Age*, August, 1930, pp. 477-79; June, 1932, pp. 223-26) as a guide, the new plant was equipped with a 20-cu.yd. electric stripping shovel, a 5-cu.yd. electric loading shovel and a preparation plant and washing and drying equipment capable of cleaning, drying, sizing and loading seven primary sizes or any mixture thereof at the rate of 600 tons per hour, with provisions for increasing capacity by the installation of additional washing units.

The Middle Grove property was selected as a result of a survey covering available coal reserves in all the northern Illinois fields, as well as available markets and transportation facilities serving them. Railroad connections are provided by the Minneapolis & St. Louis R.R., and a state highway furnishes a convenient outlet for truck shipments in case it is desirable to adopt this method of distribution in the future. Coal available for stripping aggregates 64,000,000 tons, underlying 14,000 acres in northern Fulton and southern Knox counties, and the prepared product moves to the market under the trade name "White Star."

The output of the Middle Grove operation comes from the Illinois No. 6 seam with an average thickness of 4½ ft. over the property. Average depth of the overburden is 35 ft. and, from the surface down, it consists of clay, blue shale or sandstone and a limestone cap rock. Occasionally, a stratum of "white top" is found between the cap rock and the coal. The latter is a clay peculiar to the No. 6 seam in the territory in which the plant is located, and, where it is present, frequently cuts out as much as 50 per cent of the thickness of the coal. As it lies on the top, however, it

General View of the Middle Grove Pit, Showing Stripping, Loading and Haulage

One Step in the Stripping Operation—Picking Up a Dipper-Load of Overburden

Dumping 20 Cu.Yd. of Overburden on the Spoil Bank.

Loading Coal With 5-Cu.Yd. Electric Shovel

can be removed by the stripping shovel. The limestone cap rock varies in thickness from 18 in. to 5 ft. Thickness of the shale also varies in accordance with the depth of the overburden, but in an average cut of 35 ft., about 20 ft. is encountered. This shale occasionally is displaced by sandstone.

The No. 6 seam at the Middle Grove property is underlaid by the No. 5, the interval between them being approximately 65 ft. The No. 5 offers the possibility of future shaft or slope operation in case it should become desirable.

Stripping is done by a Marion 5560 electric shovel mounted on caterpillars and equipped with a 20-cu.yd. manganese-steel dipper with renewable teeth, the largest dipper ever installed on a stripping shovel. In accordance with latest shovel-building practice, the dipper is counterweighted. Stripping proceeds on a 24-hour schedule, employing three crews. Removal of the overburden consists of making parallel cuts 45 ft. wide without blasting. This is made possible by the fact that most of the material is soft enough to be dug without the use of explosives, while the hard strata present are thin enough to be broken up by the shovel without difficulty. Cuts are staked out in advance of the shovel, and are flagged to guide the operator. The work, therefore, proceeds in accordance with definite plans laid down by the engineering force.

Provision is made for a 20-ft. coal berm on which the haulage track is placed. In line with general stripping practice, the stripping shovel works between the track and the wall, and is followed up by the loading shovel, which works between the track and the spoil bank. The track, therefore, extends along the wall to a point just in front of the loading shovel, and then curves out around the outside of the stripping unit. As the stripper proceeds, it takes all the overburden down to the coal. The remaining loose material on the top of the coal is then removed by a caterpillar tractor and fresno. Hand shoveling and the use of wire brushes and air to polish the top have been eliminated for the most part by the installation of the washery.

The coal is not blasted at the present time, but will be in the near future. A Sullivan electric-motor-driven compressor and Sullivan pneumatic drills will be used in putting down the shotholes. After the coal is shot, it will be loaded out by a Marion 4120 electric shovel equipped with a 5-cu.yd. dipper. The loading shovel works only one shift per day, as against three for the stripping unit.

Haulage at the Middle Grove mine is

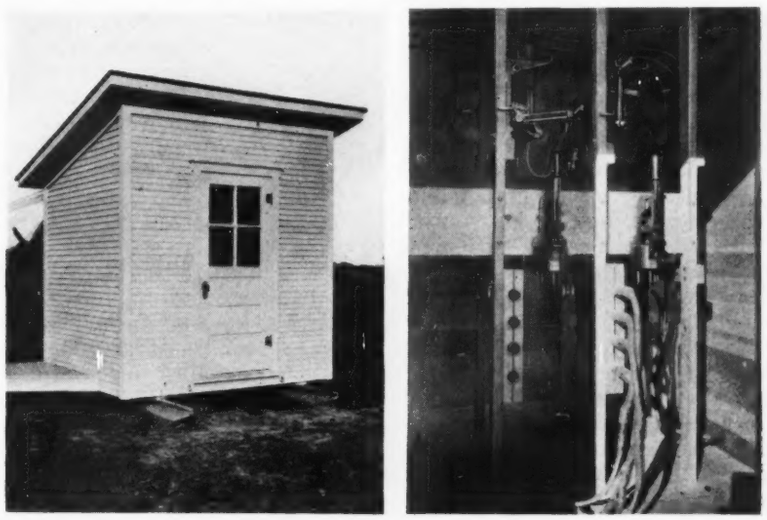
based on the use of standard-gage track, 50-ton cars and 90-ton rod engines. Railroad equipment is being used temporarily for the transportation of coal, but will be replaced in the near future by twenty 50-ton automatic drop-bottom Koppel cars. These will be operated in trains of five or six each, pulled by the 90-ton locomotives, of which four were purchased. This includes one spare. Passing tracks will be carried at the mouth of the pit to facilitate car changing, which is arranged so that one or two empties will be left in position at the loading shovel while changing is taking place. The three locomotives also will handle refuse cars between the pit and the preparation plant.

For dewatering the pit, the company has standardized on 4-in. Fairbanks-Morse trash pumps equipped with Hazleton primers to eliminate freezing troubles and other difficulties growing out of the use of foot valves. Practically all of the electrical equipment on these portable units is waterproof, which makes the usual housings or coverings unnecessary. The pumping units will be installed at semi-permanent locations determined by stadia surveys on the top of the coal bed. This method of selecting low spots as reservoirs will make it necessary, in general, to move the pumps only when a cut has been completed, and this, of course, will eliminate a large part of the long moves along the face.

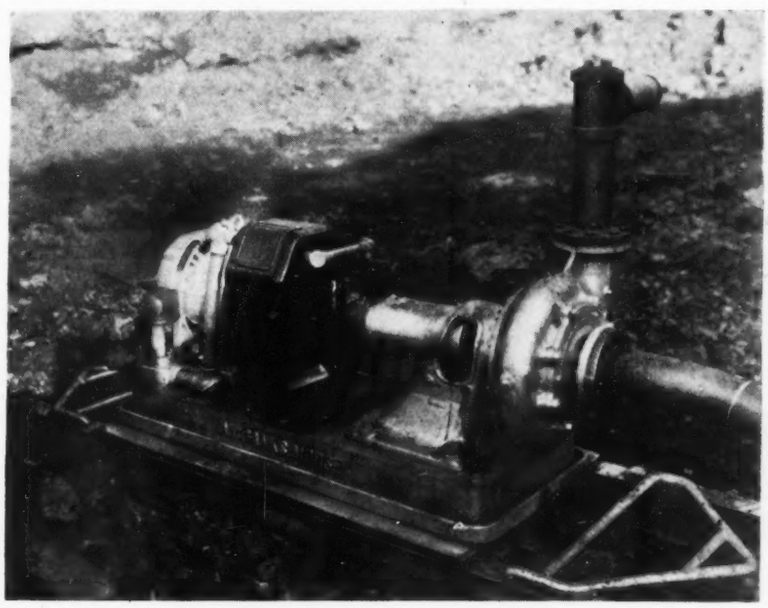
The method of supplying power for the operation of the stripping and loading units and other equipment in the pit is designed to eliminate the use of transformers or switching equipment in the pit. This is accomplished by using 4,000-volt motors on the shovels, which take current direct from the transformer station of the Central Illinois Light Co. without the interposition of intermediary reducing equipment; by mounting control equipment in switch houses on the top of the high wall; and by installing the transformers for the compressor on the loading shovel. The latter scheme is made possible by the fact that these units work in conjunction with each other. A trailing cable laid along the foot of the spoil bank will connect the transformers and the compressor. A portable station to serve the pumps will be the only other transformer equipment used in connection with the stripping, and this will be carried on the high wall.

Two branches of the 4,000-volt circuit from the utility company's station supply power for the entire Middle Grove operation. One branch consists of a pole line to the tipple transformer station, while the other consists of a 5,000-ft. ground cable serving the equipment in the pit. The latter, a jute-covered armored cable supplied by the Simplex Wire & Cable Co., is made up of three 4-0 conductors and an equal number of No. 8 ground wires. It parallels the pit and is broken every 1,000 ft. for the insertion of portable switch houses. These are wooden structures mounted on steel skids to facilitate movement.

The switch houses used at Middle Grove were adapted by T. Bergrun, chief electrician, from those originally employed at the Atkinson operation, and each one contains 5,000-volt equipment for handling one 20-cu.yd. shovel, with facilities for the installation of additional controls for another machine of the same size and plugging-in arrangements for the loading shovels and pump transformers. The ground cable enters at the end of the switch house and is carried up to connect to 4-0 solid copper insulated buses mounted on the top of the wooden control frame. Two sets of control equipment are connected to the buses, each set consisting of an isolator (a three-pole group-operated switch), current transformer, oil circuit breaker and trailing cable sockets. The function of the isolator is to indicate visibly whether or not the equipment is disconnected from the ground cable and thus insure safety in connecting and disconnecting trailing cables, while the current transformer is installed to take care of short-circuits growing out of accidents to the trailing cables. A reserve section is provided on the control frame for the installation of a third set of controls for the operation of an additional shovel. Trailing cables serving the stripping and loading units consist of 1,000-ft. Simplex and Okonite cables.



Left, Exterior of Wooden Switch House Used at the Middle Grove Operation; Right, A View of the 5,000-Volt Control Equipment



Portable Pump With Weatherproof Electrical Equipment for Dewatering Service in the Pit

PREPARATION METHODS

+At New Midland Electric Strip Operation

Provide Both Flexibility and Efficiency

FLEXIBILITY today ranks with efficiency as the hall-mark of a modern preparation plant. Both these requirements are met by the screening and cleaning facilities installed to serve the new Middle Grove (Ill.) stripping operation of the Midland Electric Coal Corporation, which include screening, loading and mixing equipment for loading seven primary sizes and all combinations thereof; a washing plant for the minus 4-in. coal; a drying plant for the smallest washed size ($\frac{1}{2}$x$\frac{1}{8}$ in.) and an auxiliary crushing and screening plant for crushing and sizing the larger sizes when market conditions warrant it. In addition, provisions were made in the design of the plant for the installation of additional washing units by extending the raw-coal and refuse-collecting conveyors. Other equipment in the plant is designed to handle the additional tonnage by increasing its rate of operation, and provision also has been made for the installation of truck-loading facilities if this method of distribution should become desirable in the future.

Present capacity of the Middle Grove preparation plant is 600 tons per hour, and seven loading tracks are provided for shipping the following sizes: hand-picked 6-in. lump and 6x4-in. egg, washed 4x2-in. small egg, 2x1$\frac{1}{4}$-in. No. 2 nut, 1$\frac{1}{4}$x$\frac{3}{4}$-in. No. 3 nut, $\frac{3}{4}$x$\frac{1}{2}$-in. No. 4 nut, and washed and dried $\frac{1}{2}$x$\frac{1}{8}$-in. No. 5 duff. All sizes except the No. 5 duff are boom-loaded, and a mixing conveyor permits the shipment of any desired combination. This conveyor also carries the large coal to the auxiliary crushing plant.

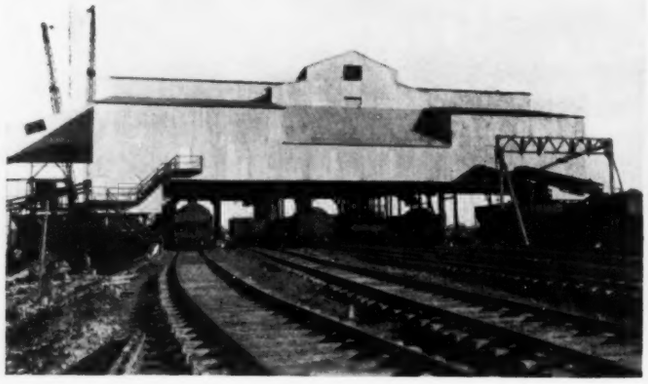
Two six-cell Link-Belt-Simon-Carves washers, each rated at 200 tons per hour, are installed for cleaning the minus 4-in. coal. While it is possible to remove practically all of the refuse from the surface of the coal before loading it in the pit, this method of cleaning does not reach the impurities within the seam. Also, hand methods of preparation cannot be depended upon for the effective separation of refuse in the smaller sizes in the tipple. Consequently, it was felt that shipment of the finer sizes with a uniform low impurity content necessitated the installation of mechanical cleaning equipment. An additional consideration was the elimination of the major part of the labor and equipment for cleaning in the pit.

Freezing troubles growing out of the difficulty of securing sufficient drainage of the fine coal by natural means dictated the installation of a heat dryer designed by K. R. Bixby, general manager, who also was responsible for the selection of the Middle Grove property, the development of the stripping methods employed and, in conjunction with the Allen & Garcia Co., the layout and design of the preparation plant. The drying plant handles the $\frac{1}{2}$x$\frac{1}{8}$-in. No. 5 duff and consists essentially of two drying units, a furnace equipped with a chain-grate stroker, a fan for circulating the heated air for drying and the necessary conveying equipment.

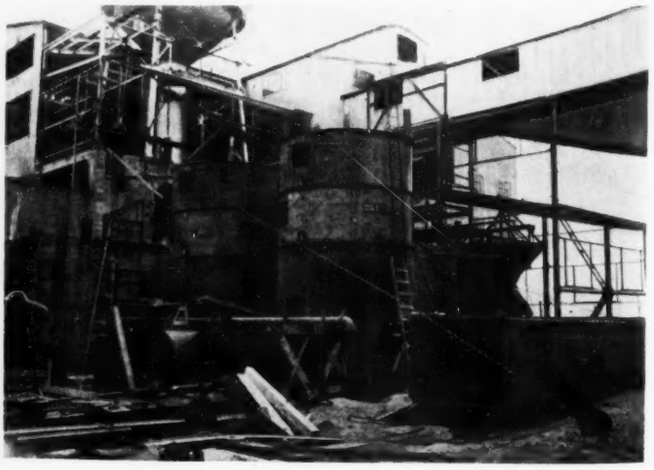
The drying units are made up of upright steel cylinders. The wet coal is fed into the top of each cylinder, and cascades down a series of inclined plates to the discharge point at the bottom. Air from the furnace at 500-700 deg. also enters the top of the drying units and follows the coal down to the fan inlet at the bottom.

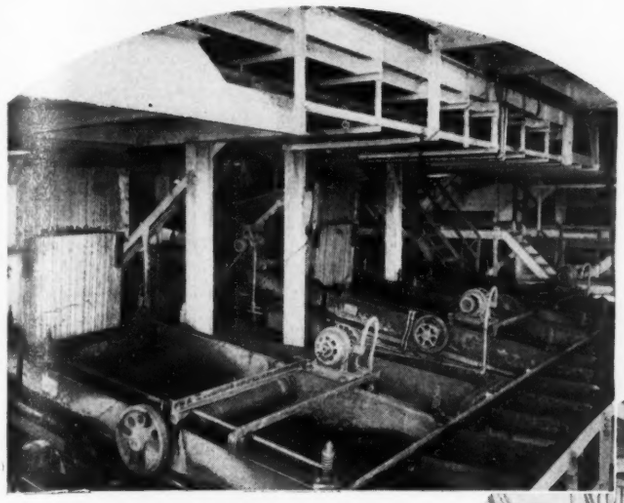
Impurities in the No. 6 seam being stripped at the Middle Grove operation include the following: the characteristic

Loading Side of the Middle Grove Preparation Plant; Lump and Egg Booms at the Right.

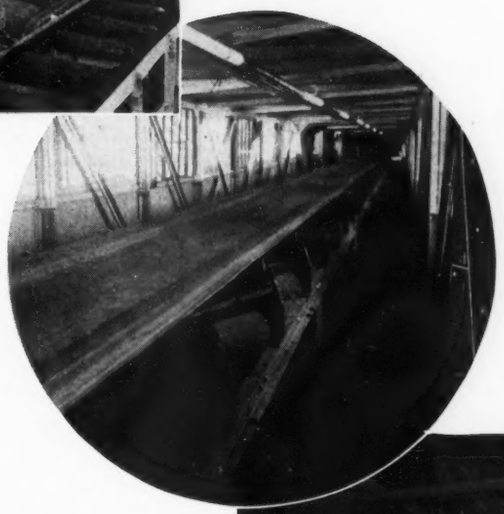


Drying Plant Under Construction; the Two Drying Units Are in the Foreground.



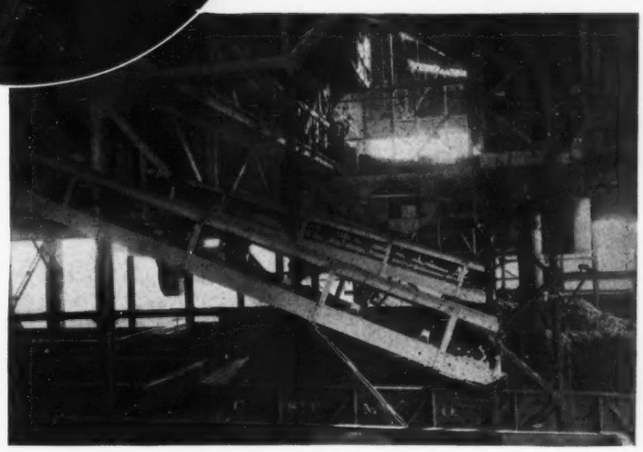


Vibrating Screen Installation for Minus ½-In. Washed Coal.

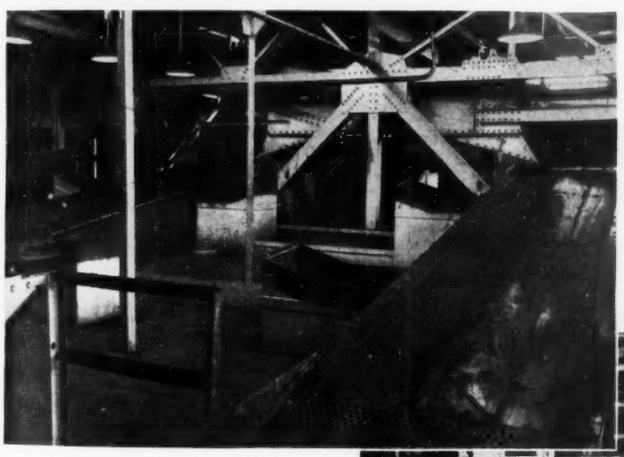


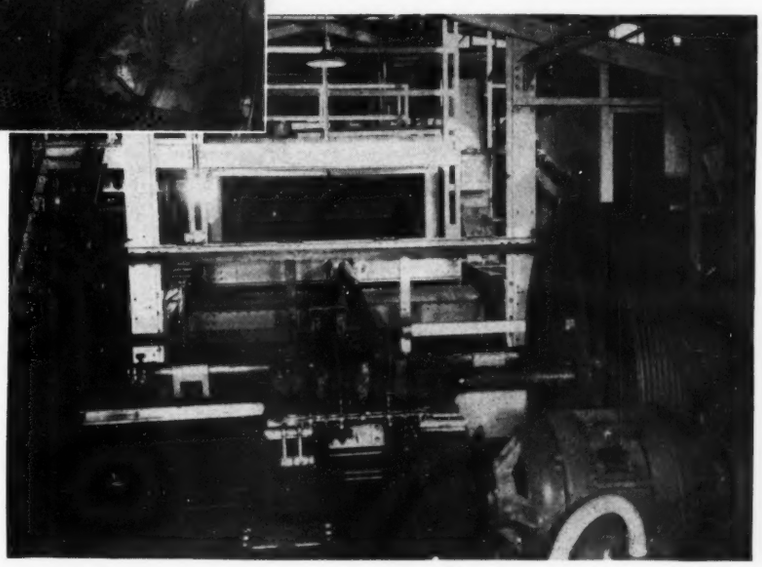
Main Raw-Coal Belt Conveyor.

Loading Bay, Showing Belt Loading Booms and, at the Right, Telescopic Loading Chutes.



Lump and Egg Picking Tables With Special Boxes for Classifying Pickings.





Main Shakers, Showing Drive and Lubricating System.

No. 6 "blue band," 2½ in. thick, near the middle of the seam; two other bands varying from ½ to ¾ in. in thickness; iron pyrites; and bone coal. In addition, the raw feed to the preparation plant may contain small quantities of refuse left from the stripping and subsequent cleaning operations in the pit.

Average specific gravity of the pure coal is 1.24. Washing gravity is 1.45, while the gravity of the lightest refuse is seldom less than 1.55 and the major portion is above 2.00. This makes it possible to wash within a 1-per cent variation in ash content. Six-cell washers were selected to take care of the problems growing out of the presence of flats in the refuse, the added length insuring complete separation of this material.

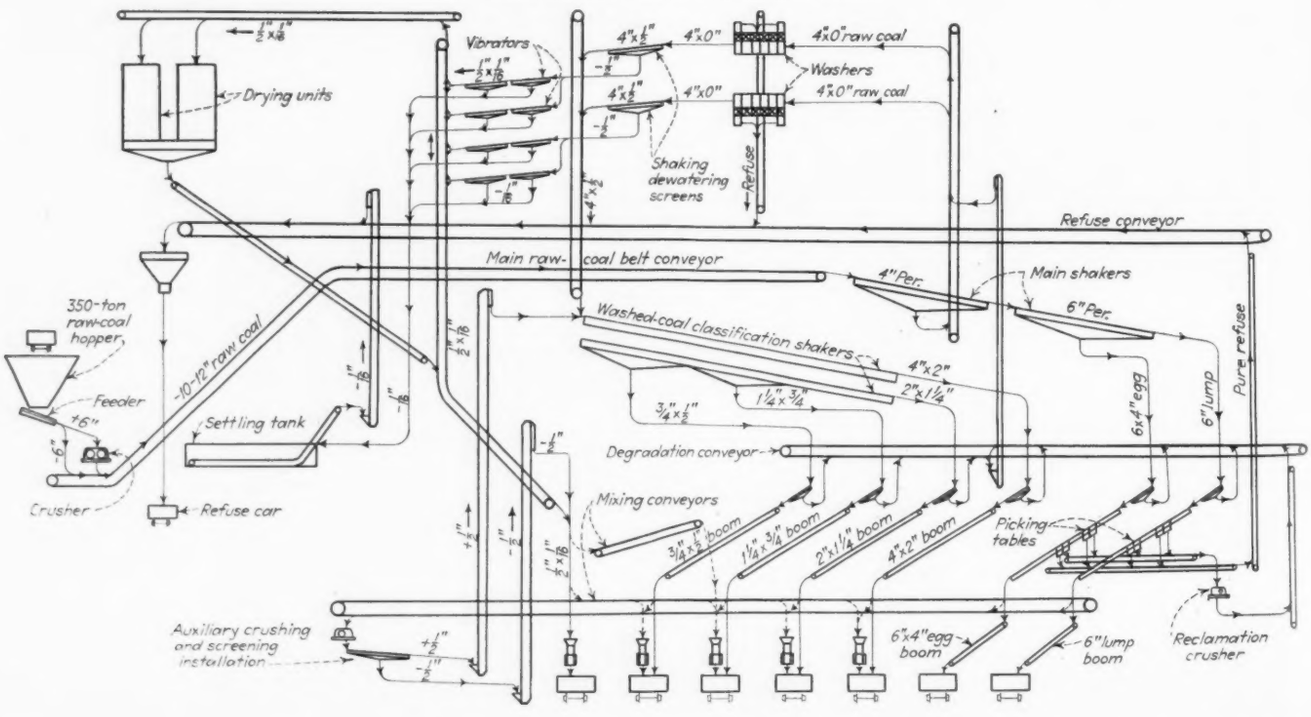
Raw coal from the pit is dumped into a 350-ton hopper. A reciprocating feeder set under the discharge opening in the hopper feeds the lumps over 6 in. into the primary crusher, a McNally-Pittsburg 36x72-in. double-roller breaker which can be adjusted to give a 24-in. opening. Separation of the crusher feed from the minus 6-in. material is accomplished by the installation of bars on the discharge end of the feeder, making, in effect, a bar screen. Both the crusher product (minus 10-12 in.) and the minus 6-in. coal separated out on the feeder are discharged onto the main raw-coal belt conveyor, equipped with a Hewitt-Gutta Percha 54-in., 7-ply, 32-oz. duck belt with rubber covers. Length of the conveyor along the center line is 247 ft. 6½ in., and the inclined section has a pitch of 18 deg. Operating speed is 320 ft. per minute. The belt is carried on 86 sets of Link-Belt troughing idlers with roller bearings and 39 return rolls.

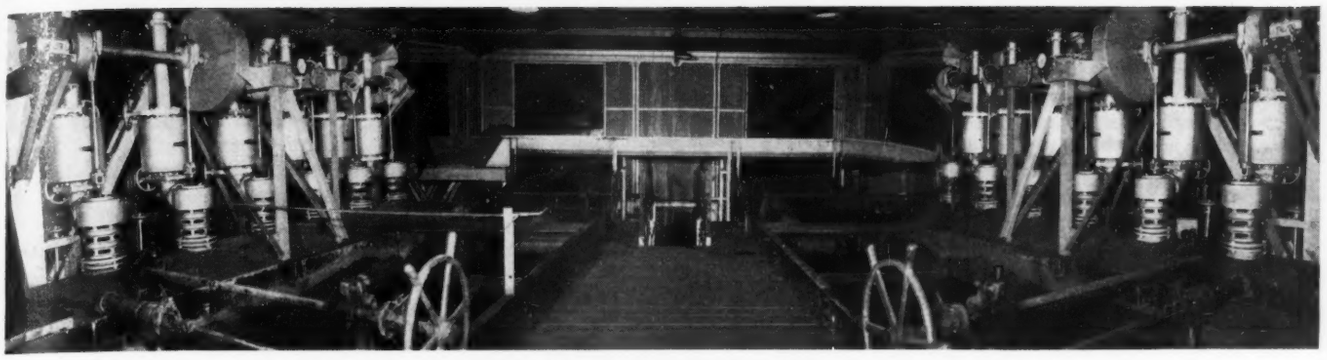
The belt conveyor discharges onto the main shaker screens, equipped with 6- and 4-in. round perforations for making 6-in. lump, 6x4-in. egg and a minus 4-in. resultant. The latter is the feed to the washers, while the lump and egg are discharged onto separate shaking picking tables, from which, after removal of the refuse, they are discharged over degradation screens to the pan-type loading booms. Double-compartment boxes on the picking tables permit the separation of the pickings into two classes of material: pure refuse and lumps containing recoverable coal. The openings to the two compartments of the picking boxes are so arranged, with the pure refuse opening next to the table, that the usual impetus given to the coal-bearing pieces will cause them to travel over the opening for the pure refuse into the proper compartment. Pure refuse drops onto a refuse-collecting conveyor, and from there is discharged onto a cross-conveyor which carries it to the refuse conveyor. The latter consists of 24-in., 4-ply, 32-oz. belt with ⅛-in. rubber covers carried on Link-Belt roller-bearing troughing idlers and return rolls. Its length from center to center of head and tail pulleys is 180 ft. 7⅝ in., and it operates at 225 ft. per minute. Pickings containing coal drop onto a reclamation conveyor, which discharges into a 24x24-in. single-roll Jeffrey crusher, where they are reduced to minus 4 in. and discharged onto a cross-conveyor feeding onto the top strand of the degradation conveyor. The latter carries the crushed material to a bucket elevator discharging onto the raw-coal conveyor supplying the washers. Degradation material from screens in advance of the loading booms also goes to the washers along with the crushed pickings.

Feed to the two washing units therefore consists of minus 4-in. raw coal from the main shakers, crushed pickings and degradation material. The discharge end of the chain-and-flight conveyor feeding the washers is arranged to distribute the coal equally between the two units. Each washer is arranged so that the heavy refuse is removed by the first two cells, the remaining four cells taking out the lighter material. Refuse from the two washing units is discharged onto a chain-and-flight collecting conveyor, which carries it up to the refuse belt. Plans call for the insulation of the washery section by double walls packed with rock wool, and for heating with Nielson unit heaters.

Cleaned coal from the washing units is sluiced to two shaking dewatering screens, one for each washing unit. These screens are equipped with ½-in. round perforations, and the coal over that size goes to a collecting conveyor, which carries it up to the two washed-coal classification screens. The upper screen is equipped with 1¼- and 2-in. round perforations for making 4x2-in. small egg and 2x1¼-in. No. 2 nut, while the lower screen has ¾-in. round perforations for making 1¼x¾-in. No. 3 nut and ¾x½-in. No. 4 nut. These sizes pass over degradation screens to the belt loading booms, which are equipped with Jones boom hoists for controlling loading and for raising the booms to discharge into the mixing conveyor.

Flowsheet, Middle Grove Preparation Plant.





Two Washing Units Are Installed for Cleaning the Minus 4-In. Coal. By Extending the Conveyor in the Background, Additional Units May Be Added at the Left.

Minus ½-in. coal from the two shaking dewatering screens is discharged onto four batteries of two Morrison vibrating screens each, in tandem. These screens are equipped with screen cloth with ⅛-in. square openings, and the coal passing over the screens is discharged onto a reversible chain-and-flight collecting conveyor, which carries it to either the No. 5 duff loading chute or the mixing conveyor, or to the drying plant feeder conveyor. If the coal is run to the dryers, the dried product is discharged onto the collecting conveyor for transportation to the loading chute or the mixing conveyor. In addition to the regular chain-and-flight mixing conveyor, a supplementary belt mixing conveyor has been installed to carry the No. 5 duff directly to the No. 3 nut loading chute in loading 1¼-in. slack. A motor-operated telescopic chute is used in loading the No. 5 duff, either with or without drying, and similar chutes are mounted along the chain-and-flight mixing conveyor for loading combinations of sizes.

Minus ⅛-in. material through the vibrating screens is sluiced to a 140,000-gal. concrete settling tank, from which it is removed after settling by a slow-speed chain-and-flight conveyor and discharged into a bucket elevator, which elevates it to the refuse belt. Water from the settling tank is pumped to a constant-head tank by a 4,000-g.p.m. Morris centrifugal pump. A similar pump is held in reserve. The constant-head tank supplies the two washing units, and clean water for make-up is added to the system through washing sprays on the dewatering and vibrating screens.

The auxiliary crushing installation for breaking down the large sizes, when necessary, consists of a Jeffrey 36x36-in. single-roll adjustable crusher, a sizing shaker and the necessary elevating equipment. Coal to be crushed is brought to the crusher on the bottom strand of the mixing conveyor. The crushed material discharges onto the shaker, which is equipped with ½-in. round perforations. Oversize is elevated to the washed-coal classification screens, and the undersize is elevated to the No. 5 duff loading chute or either of the two mixing conveyors.

The various types of refuse made in the plant are carried to a storage hopper by the refuse belt, from which the combined product is dumped into 30-cu. yd. Koppel side-dump cars. Loaded cars are hauled to the dumping point in the pit by the same locomotives that bring in the coal.

The main water supply comes from a deep well (2,777 ft.), from which it is pumped into a 3,000,000-gal. earth reservoir by a 1,200-g.p.m. Peerless "Moturbo" deep-well pump. A second 800-g.p.m. high-pressure Peerless pump supplies the sprays on the dewatering and vibrating screens in the washery

With the exception of a 125-hp. synchronous motor on the hot-air circulating fan in the drying plant, all motors in both the preparation and drying plants are, with a few exceptions, General Electric across-the-line starting machines. Each motor is equipped with its own pushbutton station for emergency use, and the controls for the entire plant are centered in a panel over the loading bay under the eye of the man charged with the duty of controlling the operation of the booms and chutes.

Except for Jones spur-gear speed reducers on the settling-tank conveyor and the sludge and crushed-pickings elevators, elevator and conveyor drives consist of Gilmer V-belts and spur gears. Jones worm-gear speed reducers are used on the boom hoists. Shaker screens are equipped with ashboard hangers and center-crank drives operated by V-belts. The Farval lubricating system has been installed for lubricating all bearings from five stations within the plant. All perforated plate for the shaker screens was supplied by Robert Holmes & Bros., Inc. Hendricks Mfg. Co. furnished the wire cloth for the vibrators.

Yard facilities at the Middle Grove preparation plant consist of a five-track empty yard with a grade of 1¾ per cent, which was built up of material excavated from a near-by pit, and a five-track loaded yard on a 1¼-per cent grade. Seven tracks are carried under the tipple on a gradient of 2½ per cent for 150 ft. Cars are handled under the tipple by Holmes retarders equipped with motors for rewinding the rope. Loaded railroad cars are weighed on 75-ton Fairbanks scales as they pass into the loaded yard.

Motor and Drive Equipment, Middle Grove Preparation Plant

	Motor Hp.	Motor R.P.M.	Drive
Reciprocating feeder.	15	900	V-belts and spur gears
Primary crusher	75	900	V-belts
Main raw-coal belt	75	720	V-belts
Main shakers	25	720	V-belts
Picking-table line shaft*	25	720	V-belts
Lump and egg booms	15	900	V-belts to line shaft
Pickings crusher	15	900	V-belt and spur gears†
Degradation conveyor	5	900	Same
Degradation and crushed-pickings elevator	5	900	Spur gears, speed reducer and chain
Washery feed conveyor	25	900	V-belts and spur gears
Washer drives (2)	15	900	Silent chains
Washer compressors (2)	40	3,600	Direct-connected
Refuse collecting conveyor	5	900	V-belts and spur gears
Dewatering shakers (2)	15	720	V-belts
Coarse-coal collecting conveyor	25	900	V-belts and spur gears
Fine-coal vibrators (8)	5	1,800	V-belts
Fine-coal collecting conveyor	25	900	V-belts and spur gears
Sludge conveyor	10	900	V-belts, spur-gear speed reducer and spur gears
Sludge elevator	5	1,760 1,165 880 580	V-belts, spur-gear speed reducer, chain and spur gears
Refuse belt	5	900	V-belts and spur gears
Washed-coal classification screens	15	720	V-belts
Boom hoists (6)	3	1,800	Worm-gear reducers
Mixing conveyor	50	900	V-belts and spur gears
Auxiliary mixing conveyor	5	...	.....
Circulating water pumps (2)	75	514	Direct-connected
Heater circulating pump	5	...	.....
Auxiliary crushing plant:			
Crusher	40	900	V-belts
Oversize screen	15	720	V-belts
Oversize elevator	15	900	V-belts and spur gears
Undersize elevator	15	900	Same
Drying plant:			
Furnace coal conveyor	2	900	.....
Blower	10	...	.....
Stoker drive	10	...	.....
Screw conveyors (2)	10	Variable	.....
Wet-coal conveyor	25	900	.....
Dry-coal conveyor	25	900	.....
Fan	125	3,600	Direct-connected

*Also drives the belt-loading booms.
†Also drives reclamation conveyor through chain take-off.

ILLINOIS INSTITUTE

+ Discusses Operation and Economics

At 41st Annual Meeting

COAL UTILIZATION and research shared honors with the bituminous code and an analysis of the surgeon's place in industry at the 41st annual meeting of the Illinois Mining Institute, Hotel Abraham Lincoln, Springfield, Ill., Nov. 3. With W. W. Williams, Benton, Ill., president, Illinois Chamber of Commerce, presiding, the annual dinner was featured by "Some Personal Observations in Russia" by Ralph Budd, president, Chicago, Burlington & Quincy R.R.

Through the appointment of two committees, the institute also took steps toward the establishment of scholarships for work on coal and improved laboratory facilities for the mineral industries of the state. George W. Reed, vice-president, Peabody Coal Co.; Paul Weir, vice-president, Bell & Zoller Coal & Mining Co.; and T. J. Thomas, president, Valier Coal Co., were appointed a committee to apply to the PWA for funds for the erection of a mineral industries laboratory at Urbana to enlarge present facilities. Establishment of scholarships to be supported in whole or in part by the institute was referred to a committee consisting of C. F. Hamilton, vice-president, Pyramid Coal Co.; J. M. Johnston, mining engineer, Bell & Zoller Coal & Mining Co.; H. H. Taylor, Jr., vice-president, Franklin County Coal Co.; George F. Campbell, vice-president, Old Ben Coal Corporation; and L. D. Smith, vice-president, Chicago, Wilmington & Franklin Coal Co., to report at the 1934 summer meeting.

Results of several years' investigation into the physical constitution of the Illinois coals as a means of providing a better basis for an understanding of the nature of the coal substance were detailed by Gilbert H. Cady, senior geologist, Illinois Geological Survey, in a paper read by M. M. Leighton, chief of the survey. This investigation shows Illinois coals to be predominantly of the normal banded type composed largely of material from forest swamp vegetation. The bands consist of the three ingredients usually found—vitrain, clarain and fusain—with occasional thin layers of durain, or splint coal. Mineral constituents separable by float-and-sink methods consist mainly of calcite, pyrite and kaolinite.

Chemically, the banded ingredients differ somewhat. Vitrain is high in ash and sulphur, with organic sulphur commonly in excess of pyritic sulphur. The unit coal value is relatively low compared with clarain and fusain, while the volatile content of the clarain is high compared with vitrain and fusain. Unit calorific value of fusain generally is about 15,000 for Illinois coals, while that of vitrain and clarain differs with the rank of the coal. The practical results of improved technique in coal description, said Mr. Cady, are: a more discriminating understanding of the extent and nature of variations; a better basis for artificially modifying and controlling the character of coal; evidence of the importance of fineness of size in selective preparation; and a better understanding of the mineral constitutents and the effect of variations on ash behavior.

The basic idea behind the formulation of the NIRA is not new, said Mr. Weir in discussing the coal code. It was preceded by a number of legislative efforts in behalf of coal and industry in general, including the Bituminous Coal Commission of 1922, which recommended some form of governmental intervention to place the industry on a sound basis; the introduction of the Watson bill in 1928: the Davis-Kelly and Hayden-Lewis bills in 1932, and the Black 30-hour bill this year. Sponsors of this legislation were interested primarily in improving the lot of labor through shorter hours and higher wages, though the coal bills also permitted collective bargaining. To assist industry in meeting some of its problems, Senator Walsh, Massachusetts, introduced a bill in 1930 to permit the Federal Trade Commission to prejudge the legality of proposed marketing practices.

"These legislative efforts undoubtedly paved the way for Senator Wagner's NIRA," Mr. Weir declared. "Labor wanted wage slashing stopped. Industry wanted destructive price slashing stopped. President Roosevelt wanted reemployment for 10,000,000 men and women. In the light of the emergency, it seemed wise to give industry and labor the things for which they were contending when these very things showed every promise of returning people to work.

"Labor conceded the relaxation of the anti-trust laws and industry conceded shorter hours and higher wages, together with collective bargaining. Governmental agencies were to be the referees, and a code of fair practice was to be written for each industry. Instead of a football game in which every man made his own rules, there was to be a game with definite rules for all participants, and the rules were to be enforced by governmental authority. Instead of chaos, there was to be orderly procedure, and the unfair players were to be eliminated if they failed to observe the written rules. Such is the plan of NIRA. In less than five months, weekly hours of labor have been shortened, wages have been raised and 3,500,000 unemployed returned to work."

While there was little difficulty in agreeing on fair practices, one of the major problems in developing the coal code was the formulation of new wage and working agreements in an area producing about two-thirds of the national tonnage but which had not for some years practiced collective bargaining as it is known in Illinois. Eventually, however, such agreements were worked out, placing Illinois for the first time in a decade on a "reasonably fair competitive basis."

Contrary to the opinions of those who fought the adoption of any regulatory

measures, the coal code "contains a minimum of governmental regulation and interference," Mr. Weir contended. In an industry as widespread as coal and so subject to internal and external competition, some outside influence is necessary in reconciling differences that otherwise would be left unsolved, to the detriment of the industry. This influence is provided in the coal code.

Development of a code is one problem and its administration another. The present code is becoming increasingly popular, and the NRA is anxious to have the industry settle its own problems in accordance with its provisions. If coal proves its ability to govern itself, it undoubtedly will be left free to do so. "If, after a fair trial, it becomes apparent that it cannot, we may look for more government in our business."

Much of the difficulty in applying a code lies in the efforts of many to get around its provisions. If the same energy were used toward making it work, a better situation would result. The whole purpose of the code is to place production and marketing on an "absolutely fair competitive basis. It is not designed to take away from the efficient and give to the inefficient. Its measure of efficiency is not sharp practice and unfair methods." The operating personnel should realize that, if their organization is to survive, efficient methods must be developed and a superior product produced. "Wage slashing is no longer a measure of efficiency. Price cutting is no longer a substitute for efficient selling."

Ideal boiler-plant operation requires a fuel of uniform quality, said Thomas Garwood, engineer, Chicago, Wilmington & Franklin Coal Co., in a discussion of dedusting. Uniformity may mean reasonably constant chemical characteristics or minimum variation in size, but better results and higher efficiency may reasonably be expected in a boiler plant where the characteristics of the fuel are known and maintained at a constant value.

Combustion engineers have for many years had as a goal the shipment of coal of uniform size from car to car and containing a minimum quantity of dust. To this end, the Chicago, Wilmington & Franklin Coal Co. has carried on experimental work for a number of years. While dedusting equipment is not new, application of the process to the production of sized coal to meet the requirements of the company's combustion engineers necessitated the development of a different type of equipment. A small unit was installed three years ago for experimental purposes and for determining the market value of the dedusted product. This unit operated on carbon and, by combination, was adaptable to the production of two grades of dedusted fines. Screen tests showed that the quantity of dust in the larger sizes was not sufficient to warrant any attempt at its removal. Production of the two grades was continued for 2½ years; at the end of this time it was found that the growing market demand warranted the installation of the present larger unit.

Under ordinary conditions, with different sizes coming from the mines at different times and with the added complication of solid cars of machine cuttings with a high percentage of fine dust, the shipment of untreated screenings with a uniformly low percentage of dust is impossible, Mr. Garwood asserted. Investigation showed that while different methods of mining might increase the lump percentage and rough handling would raise the screenings percentage, the character of the fine sizes with respect to objectionable dust would not be changed. Consequently, it was concluded that the production of a coal with a minimum percentage of dust would require mechanical treatment.

As the machine was designed to treat carbon, and as one large enough to handle the entire output of screenings was impracticable, it was necessary in the shipment of screenings to separate the carbon and recombine it after dedusting to make dedusted screenings. This recombination takes place as the coal is loaded into the railroad cars. In case sized coal is being made, the dedusted coal may be loaded separately as a small stoker fuel.

With natural screenings, including the dust, the smaller pieces fit into the openings between the larger, while the dust fills the remaining passages, thus blocking the air openings. Removal of the fine dust leaves these passages open, so that air for combustion can get to every piece of coal on the grate. This promotes uniformity of air distribution, with resultant increase in efficiency and economy, and also allows the passage of greater quantities of air, permitting greater peak loads without clinkering. Wetting also is easier, due to the fact that the fine dust which, because of its greater absorptive power, acts as a seal, is removed.

The surgeon has become an indispensable factor in coal mining in Illinois, declared Dr. John Beverly Moore, Moore Hospital, Benton, Ill., and the industry should look to him for aid in preventing and minimizing injuries. Intelligent and persistent instruction in the care of minor injuries is very important, not only because the final outcome may be serious but because the payment of temporary compensation for neglected minor injuries is a large item in the course of a year. In this the surgeon can do much through cooperation with company officials and, in fact, he should come in contact with the men in some other capacity than the necessary care of an injury.

Friendly, trustful cooperation between the surgeon and the compensation department is essential to efficiency. The department has a right to expect prompt, accurate reports, prompt release when a man is able to return to work and a plain statement of facts, as far as possible, as to the employee's final condition. Getting a man back to work sometimes is a very difficult task, due to lack of cooperation between operating and compensation departments. Quite frequently, the operating organization insists that a man cannot return except to his original job, whereas if he were allowed to work on a rehabilitation squad, which Dr. Moore recommended, doing odd jobs under a firm but understanding supervisor, the use of the injured part, in a number of instances, would hasten final recovery.

Institute Officers

H. A. Treadwell, general superintendent, Chicago, Wilmington & Franklin Coal Co., Benton, Ill., was elected president of the Illinois Mining Institute at the annual meeting. C. J. Sandoe, West Virginia Coal Co. of Missouri, St. Louis, Mo., was chosen vice-president, and B. E. Schonthal, Chicago, was reelected secretary-treasurer.

The 1934 executive board is composed of the following: W. J. Austin, Hercules Powder Co.; Paul W. Beda, Old Ben Coal Corporation; Paul Halbersleben, Sahara Coal Co.; C. F. Hamilton, Pyramid Coal Co.; M. M. Leighton, Illinois Geological Survey; George C. McFadden, Peabody Coal Co.; John G. Millhouse, Illinois Department of Mines and Minerals; F. S. Pfahler, Superior Coal Co.; E. F. Stevens, Union Colliery Co.; H. H. Taylor, Jr., Franklin County Coal Co.; T. J. Thomas, Valier Coal Co.; and Paul Weir, Bell & Zoller Coal & Mining Co.

Completing the Record

In addition to the particular type of loading machine described in the story on mechanization at the Orient No. 1 mine of the Chicago, Wilmington & Franklin Coal Co., in Franklin County, Illinois, published in the October, 1933, issue of *Coal Age* (pp. 329-330), there also are seven Joy loaders in operation at the same mine. Joy loading machines have been in use at Old Orient since the mechanization program was first started, in the summer of 1931, and are employed in both entry driving and room working in either level or pitching territories, in accordance with the general plan of mechanical loading developed by the company for this operation.

HOW BLOW-OUT SHOTS

+ By Reflected Waves

Cause Ignition of Firedamp

By D. B. GAWTHROP

Assistant Explosives Engineer
U. S. Bureau of Mines
Pittsburgh Experiment Station
Pittsburgh, Pa.

NO EXPLOSIVE is safe under all circumstances, and even permissible explosives may ignite firedamp where the prescribed conditions of the Bureau of Mines are not met, though such explosives, in permissibility tests, are fired into the most explosive mixture of natural gas and air and, for approval, must not ignite the gas mixture in any of the ten trials made. It will be shown photographically how the pressure wave from the discharge of an explosive can assist, or possibly initiate, the ignition of firedamp and how the physical dimensions of a chamber affect results when testing explosives for use in coal.

To form some judgment as to the safety of an explosive when fired into a flammable gas-air mixture, much must be known as to the way in which an explosive explodes and as to the effects its explosion produces. To illustrate, black powder when fired produces a large flame, and a small quantity of it readily ignites firedamp. However, firedamp will not be ignited by certain explosives even when fired so as to produce flames 3 ft. long. Evidently, flame from explosives will not always ignite firedamp; hence, ignition, in some cases, must be due in part to some other cause.

Photographs of the ignition of firedamp in a large testing gallery show that when a gas-air mixture is ignited by an explosive there is a definite lag during which very little actinic flame is recorded. Following this pause, the gas begins to inflame several feet beyond the mouth of the shothole. The flame then spreads in both directions along the axis of the cylindrical chamber, increasing in intensity by pulses as if the gas mixture was being subjected to some disturbance.

The pulsating increase of flame intensity in an ignition of firedamp suggests that the ignition is influenced by the pressure wave which the explosive creates. The pressure wave will be shown expanding spherically in all directions in front of the flame and gases that the explosive has generated. It is known that the air in the wave front is very highly compressed and that a surface will reflect this wave just as it will a wave of sound. It is known also that mixtures of firedamp and air, even when cold, can be fired by suddenly compressing them some twelve to twenty-fold, enough heat to fire them being generated by the work of compression.

A pressure wave causes a distinct change in the density of the atmosphere through which it is passing. A similar change in the density of the atmosphere, although not as distinct, may be observed in the heated air rising from the radiator of an automobile. The change in the index of refraction between two or more strata thus formed in the atmosphere makes such phenomena visible, and with suitable optical apparatus the contrast may be made so great that it can be photographed, one of these ways being known as the Schlieren method of photography. A description of the apparatus and the principles involved have been published by the author.*

To illustrate how a pressure wave is sent out by an explosive and the way in which it is reflected from roof and floor of an inclosure, shots were fired into a small chamber and the results photographed, the smallness of the chamber being necessitated by the size limitations of Schlieren photographic methods. An electric detonator placed in a ¾-in. pipe was fired into a chamber 10 in. high, having only roof, floor, and one face. This arrangement permitted to be taken in one exposure comprehensive photographs that include a view of the pressure wave and its components as reflected from roof and floor.

The accompanying photographic illustrations are Schlieren snapshots taken at successive times after a shot was fired. With each photographic cut is given an explanatory diagram of the wave motion and of the movements of the products of detonation.

Fig. 1—Here is shown the disturbance sent out of the shothole in the initial stage of the explosion. The spherical pressure wave indicated has not yet reached roof or floor. The particles in advance of the wave are pieces of the copper shell from the detonator. Particles having a velocity greater than that of sound in air produce conical waves similar to those produced by projectiles in flight.

Fig. 2—Reflection of the pressure wave from roof and floor has begun. The reflected wave is in turn reflected from the face and is photographed as a second wave advancing behind the main pressure wave.

Fig. 3—The components of the pressure wave as reflected from roof and floor are converging on the gaseous products of detonation of the shot.

Fig. 4—The components of the reflected pressure wave collide along the

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*Review of Scientific Instruments. 2. p. 522. 1921.

axis of the chamber within the smoke and gases from the explosive, compressing and heating the hot gases which at that time normally are expanding and cooling.

Fig. 5—The components of the reflected pressure wave have intersected along the axis of the chamber. One of the points of intersection is shown at the edge of the photographic illustration just outside of the gases and smoke. Though these have expanded, their expansion, as can be seen, is extremely slow when compared with the motion of the pressure wave.

Fig. 6—All of the primary wave and its components as reflected from the roof and floor have passed on, leaving a trace of the second wave, which can be seen behind the diffusing smoke and gases.

The significant feature of these photographic illustrations is that the reflected components of the pressure wave collide and intersect within the area occupied by the gases and smoke from the charge of explosive. The initial point of contact continues as two points of intersection moving in opposite directions along the axis of the chamber. The energy of this collision may be sufficient to ignite a flammable gas mixture heated, but not previously ignited, by contact with the flame and gases from the explosive. Previously published photographic records of gas ignition indicate that is true, for the flame of the ignition begins at a corresponding point and spreads in both directions along the axis of the chamber.

This feature in the ignition of a gas mixture by an explosive is not limited to small chambers, but will occur in any chamber in which the pressure wave is symmetrically reflected. However, if the size of the chamber is increased, the initial collision of the wave motions will occur at increasing distances from the shothole and hence at points further removed from the gases sent out by the explosive.

It should therefore be more difficult in larger explosion chambers to ignite a flammable gas mixture with a given charge of explosive, for the wave motion will be less effective in compressing the gases from the explosive. Tests made in explosion galleries of different diameters indicate that this is so. Identical charges of explosive may be chosen that will ignite a gas mixture in a small chamber and fail to do so in a larger one.

In this article the causes of blow-out, or "windy," shots will not be reviewed. Suffice it to say that if such a shot occurs the likelihood of a gas or dust explosion will undoubtedly be influenced by the pressure wave which the explosive creates and that in a thick seam of coal, where more headroom is provided, an explosion from this cause is less likely to occur than where the seam is thin.

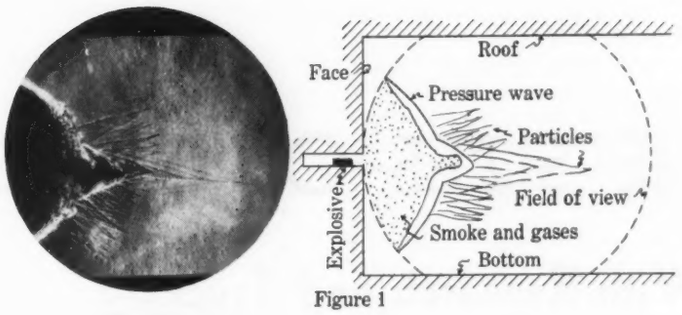


Figure 1

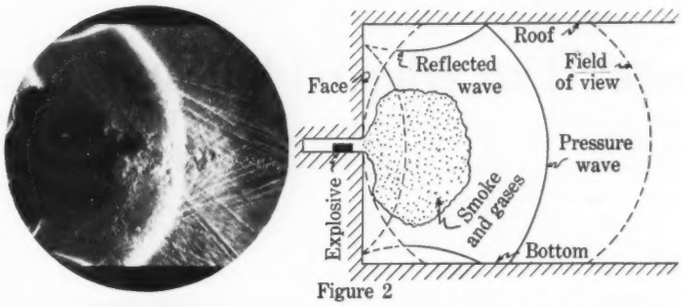


Figure 2

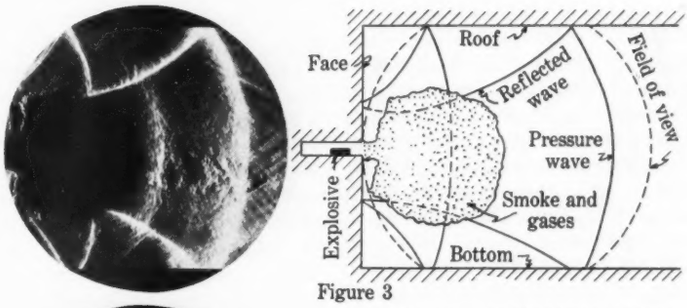


Figure 3

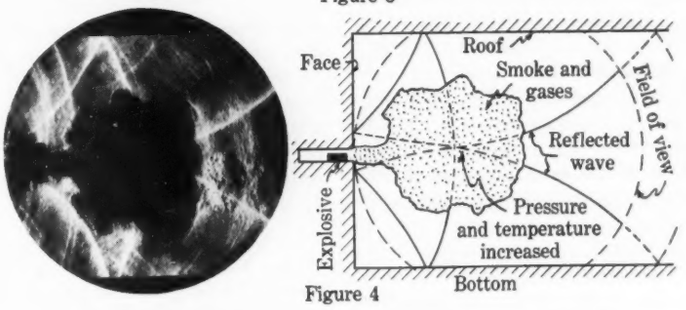


Figure 4

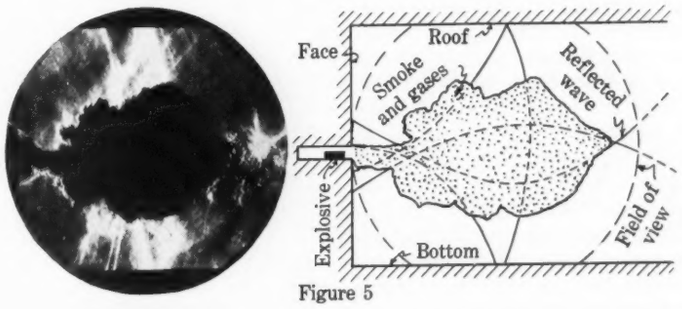


Figure 5

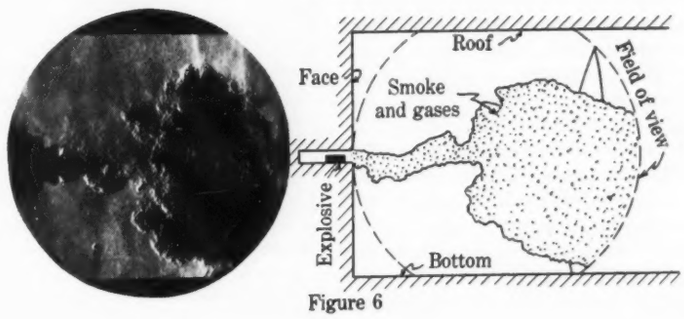


Figure 6

FINE SIZES OF COAL

+With Research and Trucking

Engage Third Mineral Industries Conference

PROBLEMS in the preparation and distribution of fine sizes, research, and trucking of coal from the mines featured the program of the two technical sessions of the Third Pennsylvania Mineral Industries Conference at State College, Pa., Nov. 10-11, under the auspices of the School of Mineral Industries, Pennsylvania State College. The "New Deal" as it affects bituminous coal was discussed by John C. Cosgrove, president, West Virginia Coal & Coke Corporation, and Dr. L. E. Young, vice-president, Pittsburgh Coal Co., at the conference dinner at the Nittany Lion Hotel following the first day's technical session.

NIRA is not greatly different in principle from the sales agency plan, said Mr. Cosgrove, who urged the fullest cooperation as the best means of obtaining the maximum benefits out of the NRA. The bituminous code, he declared, offered the only real price control yet developed whereby industry, instead of the government, initiates the schedules, with the latter wielding only the veto power. While higher wages may have some limiting effect, the code presents the best opportunity yet for making a profit, he declared. Reviewing the negotiations leading up to the Appalachian agreement, Dr. Young expressed the opinion that a further increase in wages would be granted on April 1, 1934, whether justified or not.

As in other fields, progressive central Pennsylvania operators have turned to mechanization and coal cleaning to reduce costs and meet the competition of other low-priced fuels, said R. G. Pfahler, chief engineer, Berwind-White Coal Mining Co., in a paper read by Dr. E. P. Barrett, Pennsylvania State College. Because of the extreme friability of the coal and other conditions unfavorable to the general use of other types of loading equipment, this field favors conveyors. Where applicable, shaker conveyors are preferred, but good roof and regular grades are necessary for their maximum success; consequently, chain-and-flight conveyors, due to their adaptability to a wide range of conditions, are in the majority.

Installations vary from one machine per room discharging into a mine car to a group of six or more feeding onto a gathering belt. While the latter set-up eliminates much of the yardage cost and investment in track, trolley and other accessories, one serious drawback is the adverse effect on coal quality growing out of the undue concentration achieved. Available belt lengths may also necessitate shortening room entries, thus making more panels necessary and unduly complicating the rearrangement of the mine layout. Another combination, possibly less economical, is the use of two or three conveyors discharging onto a cross conveyor, which in turn feeds onto a pit-car loader.

Table I — Bituminous Coal Trucked to Points Distant Ten Miles or More From the Mines in 1932, by States, in Net Tons

	Total Production	Ten Miles or More Total Trucked	Ten Miles or More Per Cent Trucked
Alabama	7,856,939	54,954	0.7
Alaska	102,700	.....	.....
Arizona	6,877	3,877	56.4
Arkansas	1,033,471	60	....
California, Idaho, Oregon	16,319	464	2.8
Colorado	5,598,721	839,321	15.0
Georgia	27,208	.....	.....
Illinois	33,474,553	1,069,634	3.2
Indiana	13,323,573	206,519	1.5
Iowa	3,862,435	248,225	6.4
Kansas	1,952,885	32,659	1.7
Kentucky	35,299,582	67,820	0.2
Maryland	1,428,937	11,101	0.8
Michigan	446,149	37,667	8.4
Missouri	4,069,598	96,488	2.4
Montana	2,125,225	10,739	0.5
New Mexico	1,263,386	4,325	0.3
North Carolina	1,900	450	23.7
North Dakota	1,739,658	41,690	2.4
Ohio	13,909,451	227,967	1.6
Oklahoma	1,255,466	1,864	0.1
Pennsylvania	74,775,862	1,055,485	1.4
South Dakota	49,074	10,886	22.2
Tennessee	3,537,882	41,359	1.2
Texas	636,590	626	0.1
Utah	2,852,127	20,045	0.7
Virginia	7,692,180	5,836	0.1
Washington	1,691,426	93,957	5.9
West Virginia	85,608,735	32,086	0.1
Wyoming	4,170,963	34,165	0.8
Total	309,709,872	4,250,269*	1.4

*Includes 616,974 tons, a part of which went less than ten miles from the mines; separation not possible.

Mechanical cutting has kept pace with the advance in mechanical loading, though in some cases where considerable timbering is required to support tender roof at the face under heavy cover, the use of conveyors or chain cutters is either uneconomical or impracticable. Clay veins and rolls also enter the picture, and in such places cutting labor has been reduced by the introduction of pneumatic picks. These also may be employed in drilling coal or rock, taking down roof or lifting a few inches of bottom. In coal, they increase the efficiency of the miner to a figure comparable with that of loaders in machine sections. Although pneumatic picks have reduced lump percentage slightly, they also have reduced the output of slack and dust, with the result that average coarseness of the coal has improved.

Mechanical loading frequently makes necessary the use of mechanical cleaning; Mr. Pfahler felt, however, that increasing exploitation of seams containing more impurities and greater discrimination in buying probably were the primary factors in its rapid development. Marked friability, with consequent high percentage of fines, early indicated the adoption of air cleaning in central Pennsylvania to avoid freezing and the expense of handling sludge, water clarification and drying. Later, it was found that best results could be obtained by washing the larger sizes, and the dividing line has steadily dropped until it is now between $\frac{1}{4}$ and $\frac{1}{2}$ in. Drying plus $\frac{1}{4}$- or $\frac{1}{2}$-in. coal presents no particular problem, and when the dry-cleaned fines are added the resulting moisture is low—an important factor in central Pennsylvania, where most of the output is shipped as mine-run.

Selection of wet-washing equipment is a comparatively simple matter, Mr. Pfahler contended, resting as it does on a comparison of washing results. But, as there are very few types of dry-cleaning equipment, none of which, he felt, makes a perfect separation at any

point on the washability curve, the problem is more difficult. This is offset in central Pennsylvania, however, by the fact that the smaller sizes require less cleaning and are easier to clean. While existing air systems can be made to meet present market requirements, sharper separation at the desired point and sufficient adjustability to cover a wide range of market demands will be demanded in the future.

In a number of instances full realization of the effectiveness of air units already in operation has been prevented by: sacrifice of quality for quantity; recirculation of air to cut down outlay for dust collection, with consequent clogging of the decks by dust, reducing air supply below normal and disturbing distribution; irregular wet-and-dry coal feed, with the dust fraction carrying 5 to 10 per cent moisture against an average of 2 to 3 per cent for all the fines and consequently agglomerating the bed on the table so that stratification cannot take place; infinite range of particle sizes in the smallest fraction cleaned (8- or 4-mesh).

Dedusting offers the possibility of relief from the dust problem, as it will provide the desired classification, materially reduce the size range in the smallest fraction of the fines and probably increase the capacity of the cleaning units. While moisture in the dedusted coal may be only slightly less, that remaining will consist largely of a superficial film on the particles, which will not interfere with stratification. Inasmuch as the cost of dedusting equipment and such small auxiliary dust-collecting machinery as may be necessary should not exceed the cost of the usual dust-collecting facilities, its advantages should go a long way toward assuring a market in the coal industry.

Improved mining methods in themselves should not alter the problem of cleaning fine sizes, Mr. Pfahler declared. In fact, such a change may improve fines both quantitatively and qualitatively. While improper selection of mining methods may increase the quantity of small coal, cleaning-plant degradation due to mechanization also may be a factor, and may be responsible for some of the poor results on small sizes, especially where proper allowance was not made for this eventuality in the design of the plant.

Another factor now receiving attention is the effect of crushing large coal on the cleaning problem. In central Pennsylvania, the inherent ash of the coarse sizes is relatively high, with the result that crushing does not result in coal particles free from impurities. Consequently, when the crushed material is mixed with the natural slack, the resulting product may be very difficult to clean. More study, declared Mr. Pfahler, should be given to the effect of concentration of operations in mechanical mining on the cleaning-plant feed. At the average hand-loading mine, with coal coming from a relatively large number of places over a wide area, the raw feed will be fairly uniform in spite of fluctuations in quality in individual sections. But with concentrated mechanical loading, the quality of the raw feed will vary from zone to zone.

While the technical problems involved in the preparation of fine coal have been fairly well solved, economic marketing of this size is yet to be achieved, declared C. P. Proctor, chief chemist, Pittsburgh Coal Co. One of the major factors in the cleaning of fines is the character of the coal; if soft and friable, the low-ash material breaks up and dilutes the fines. In many cases, this size is the cleanest and further treatment may not be necessary. When the coal is hard, the dilution of the high-ash fines may not be as great, and impurities may be materially reduced with the proper equipment. In a large part of the Pittsburgh seam area, the fines are inherently lower in grade than the block, and it is not possible, except with the loss of much good coal, to clean them down to the same ash.

Several types of equipment are available for washing coal down to 48- or 100-mesh, but cleaning of sizes below these limits, said Mr. Proctor, necessitates further processing, such as froth flotation or amalgamation. Technical problems in oil froth flotation have been fairly well solved, and it has been found that freshly crushed coal can be efficiently cleaned over a wider size range than wet sludge. Tests on Pittsburgh seam coal show this range to be minus 10-mesh on crushed coal and minus 48-mesh on wet sludge, the probable reason being that oxidation of the coal tends to depress, rather than aid, the floatability of the particles. It is possible to remove slate but not high-ash carbonaceous material by amalgamation with oil. This process holds out hope for the preparation of colloidal fuel through wet grinding of the amalgam and the addition of oil. Complete drying of fine coal involves a rather large capital investment. Tests have been made recently on a new sludge-drying method, in which the filter cake is first formed into balls by rolling it in a drum; in this process, the coarser coal is covered by the fines and the balls are then dried in a D-L-O dryer.

At present, said Mr. Proctor, dry-cleaning fine coal does not result in a sharp separation at any size, and the material under 14- to 28-mesh is practically unchanged. However, the drying problem is eliminated, though it should be noted that when all the fine coal is heat-dried after wet washing the moisture content is more uniform and may be lower than that of the incoming coal. Dry cleaning has the dust-collecting problem, which is comparable to sludge recovery in wet washing. Contrary to general belief, damp coal can be reasonably well cleaned on air tables, the chief factor being a uniform feed, whether dry or damp. One dry plant in the Pittsburgh district is now equipped with manually operated sprays for adding the necessary moisture when the feed is dry.

Wet washing and drying fine coal is two or three times more costly than cleaning the larger sizes, Mr. Proctor pointed out, due to the lower capacity of the washing units, the dewatering problem and the added water clarification and sludge handling necessary. Dry-cleaning fines also is more costly than treating the larger sizes, due to the lower capacity of the equipment and the cost of handling the added dust-laden air. In either case, in order to justify this cost, sales realization should be higher, sales cost should be lower through lowered sales resistance, or a waste product should be turned into a salable one.

In some cases, the flotation of the minus 48-mesh coal increases the fusion temperature of this size, as well as that of the total fines. This may make the coal more valuable than ash and sulphur reduction, and thus warrant the cost of the equipment. When cleaning minus 48-mesh by amalgamation, the oil should be reclaimed by distillation or its cost recovered in the sales price. On large coal ($\frac{3}{8}$ to 2-4 in.) the cost of cleaning

Mineral Industries Highlights

What are the special problems involved in the preparation of the fine sizes of coal? R. G. Pfahler discusses these in the light of experience in central Pennsylvania, pointing out the effect of modern mining methods on the output of fines and analyzing problems connected with the application of wet- and dry-cleaning systems, with pertinent comments on some of the problems yet to be solved in mechanical cleaning. C. P. Proctor comments on the status of the economic marketing of fine sizes, analyzes the factors entering into wet and dry cleaning, discusses flotation and the cost of mechanical preparation and outlines possible outlets for fines. Paul Sterling takes up the preparation of fine sizes of anthracite and analyzes market prospects.

New uses for coal are a fundamental objective of research. H. G. Turner describes the questions involved in the use of anthracite fines for filtering and details their advantages. H. H. Lowry offers some suggestions on bituminous research objectives.

What is the extent of the trucking movement in the various coal fields of the country? W. H. Young analyzes the trucking situation in 1932, and offers figures to show its magnitude.

is partially offset by savings growing out of the elimination of picking labor and the recovery of additional coal through crushing of pickings. It is quite common to have twice as many men picking 2x4- or 4x6-in. coal than are necessary to screen mechanically and clean minus 2- or 4-in. coal. A study by the Pittsburgh Coal Co. indicated that at some mines in the Pittsburgh district, pickings crushed to 4 in. contained slightly more than 50 per cent of salable coal.

Mr. Pfahler's statement that fines produced by crushing large coal are in many cases entirely different in chemical composition from natural screenings was echoed by Mr. Proctor, who declared that it was reasonable to expect that anthraxylon (bright coal) and fusain would concentrate in the fines. Of the two types of fusain, soft and hard, the former tends to go into the very fine sizes. It ranges from low to medium in ash and sulphur, and the lime content of the ash ranges from low to very high. Hard fusain generally runs about 25 per cent ash, which contains a high percentage of lime. The high lime content of the fusain may result in a high fusion temperature, but when it is mixed with coal ash, the actual fusion temperature of the combination generally is lower than the calculated value. Fusain, which is concentrated in the fines, has been found to be beneficial to coke structure if uniformly distributed, the quantity for maximum improvement varying from 3 to 6 per cent.

Some steam plants have changed over to larger coal, said Mr. Proctor, because it was found that the normal percentage of fines in mixtures from minus 4 to minus 1 in. was too high. However, a certain percentage of fines normally is advantageous, and coal is being prepared with a controlled proportion of this fraction. Mixing fines with coarse coal broadens the market for this size. Other present and possible outlets for fines include the manufacture of briquets and colloidal and low-temperature fuel.

Buckwheat and the smaller sizes of anthracite came into use about 1880, said Paul Sterling, chief mechanical and preparation engineer, Lehigh Valley Coal Co., and between 1890 and 1932 the proportion of fines rose from 10 to 33 per cent of the total commercial shipments of hard coal. A study by the Anthracite Institute showed that New York, Pennsylvania and New Jersey consume 80 per cent of all anthracite, and also absorb approximately 90 per cent of the buckwheat, 93 per cent of the rice and 95 per cent of the barley. Steam sizes consumed in the ten largest cities in these states are: buckwheat, 57 per cent; rice, 56 per cent; barley, 29 per cent, while the three best cities accounted for the following: buckwheat, 47 per cent; rice, 44 per cent; barley, 14 per cent, indicating that most of the barley apparently goes to the smaller towns where the mills require large tonnages of industrial fuel. This also is true of rice to a lesser extent, and still less of buckwheat, indicating the relatively larger use of these sizes for domestic purposes, particularly buckwheat.

A survey of cumbustion equipment in 1931, 1932 and 1933 indicates that 5.4 per cent of all homes enjoyed automatic heat (magazine-feed or stoker-equipped plants) in the latter year, against 1.9 per cent in 1931. Investigation also shows a demand for automatic heat in about 7 per cent of all homes. With a total of 12,000,000 homes, approximately 400,000 live prospects at an average of $270 each exist, considering that one-half of the 7 per cent are of such station as to be attracted by this luxury. At an average annual consumption of 10 tons per home, the potential market aggregates 4,000,000 tons of junior sizes, not counting supplementary demands for water-heating, etc. Analysis of the 1931-32 tonnages of twenty companies whose output of buckwheat and smaller was close to 50 per cent of their entire production indicates that future market absorption will be about equally divided between domestic sizes and pea and smaller, due to the demand for junior sizes in automatic heating.

In the preparation of the junior sizes, Mr. Sterling observed that ash contents up to 15 per cent seem to be satisfactory, although some contracts set a 10-per cent limit. Results of many tests on all types of washing equipment indicate the following recoveries: 16-per cent ash, 87 per cent; 15-per cent ash, 85 per cent; 14-per cent ash, 83 per cent; 12-per cent ash, 80 per cent. While a reduction in ash unquestionably produces a better-burning and more economical industrial fuel, low-ash domestic coal burns too freely, due to the difficulty of controlling the fire, thus increasing the consumption. The best ash classification for domestic coal should be approximately 15 per cent.

The recently developed anthracite gas machine is regarded as one means of regaining some of the hard-coal losses. Gas cost with this equipment is 15 to 25c. per M of city gas equivalent. In one case, officials of a brick company which installed an 8-ft. unit feel that 600 lb. of anthracite will replace 1,400 lb. of hand-fired bituminous, while a 10-ft. unit installed by a steel company to replace oil at 3.75c. per gallon has reduced power production cost approximately 25 per cent.

In closing, Mr. Sterling advocated equal prices on all sizes of anthracite from egg to buckwheat inclusive, as well as a decrease in the general level for these sizes and an increase in the level for the smaller sizes as a means of benefiting the industry. He also recommended the construction of individual power plants at mines and manufacturing plants, and cited possible savings growing out of the use of barley as a fuel for them.

The advantages of fine anthracite for filtering purposes was the theme of the opening address at the Nov. 11 session by H. G. Turner, director of research, Anthracite Institute, State College, Pa.

Table II—Percentage of Total Number of Trucking Mines in Each Size Classification in 1932 for Ten Principal States

	Total Number Trucking Mines	Per Cent of Total: Less Than 1,000 Tons	1,000-5,000 Tons	5,000-10,000 Tons	10,000-25,000 Tons	25,000-50,000 Tons	Over 50,000 Tons
Alabama	18	27.8	38.9	11.1	16.7	....	5.6
Colorado	94	17.0	36.2	9.6	10.6	6.4	20.2
Illinois	106	3.8	31.1	20.7	13.2	18.9	12.3
Indiana	29	3.5	31.0	6.9	13.8	13.8	31.0
Iowa	57	7.0	47.4	22.8	12.3	3.5	7.0
Kentucky	21	19.0	38.1	....	14.3	4.8	23.8
Missouri	37	29.7	32.5	13.5	10.8	10.8	2.7
Ohio	65	12.3	43.1	18.5	16.9	1.5	7.7
Pennsylvania	149	6.0	26.9	20.1	19.5	6.7	20.8
Washington	20	20.0	15.0	25.0	15.0	20.0	5.0

Table IV—Proportion of Total Production of Trucking Mines Moving by Truck

	Mines Producing Per Year: Under 1,000 Tons: Output, Tons	Trucked: Tons	Trucked: Per Cent	1,000-5,000 Tons: Output, Tons	Trucked: Tons	Trucked: Per Cent	5,000-10,000 Tons: Output, Tons	Trucked: Tons	Trucked: Per Cent	10,000-25,000 Tons: Output, Tons	Trucked: Tons	Trucked: Per Cent
Alabama	3,166	2,489	78.6	16,255	10,262	63.1	17,869	17,767	99.4	56,608	15,953	28.2
Colorado	7,984	5,762	72.2	71,095	55,216	77.7	64,522	41,093	63.7	158,206	93,507	59.1
Illinois	2,514	865	34.4	85,562	50,069	58.5	177,002	130,822	73.9	235,891	162,514	68.9
Indiana	980	300	30.6	25,235	8,333	33.0	15,943	13,465	84.5	69,614	32,600	46.8
Iowa	2,939	993	33.8	76,612	34,205	44.6	99,064	78,440	78.8	94,721	61,296	64.7
Kentucky	2,226	642	28.8	17,878	10,033	56.1	.....	.....	....	39,402	24,678	62.6
Missouri	5,928	2,857	48.2	34,766	23,046	67.3	38,832	19,990	51.5	53,204	26,192	49.2
Ohio	4,532	2,392	52.8	67,541	51,420	76.1	76,586	41,611	54.3	170,482	81,835	48.0
Pennsylvania	5,341	2,590	48.5	116,322	81,249	69.8	200,415	108,391	54.1	476,873	209,830	44.0
Washington	1,652	947	57.3	7,473	5,071	67.9	35,136	18,669	53.1	40,919	13,342	32.6

Table III—Percentage of Total Tons Trucked From Mines in Each Size Classification in 1932 for Ten Principal States

	Total Tonnage Trucked	Per Cent of Total: Les Than 1,000 Tons	1,000-5,000 Tons	5,000-10,000 Tons	10,000-25,000 Tons	25,000-50,000 Tons	Over 50,000 Tons
Alabama	54,954	4.5	18.7	32.3	29.0	....	15.5
Colorado	839,321	0.7	6.6	4.9	11.1	5.3	71.4
Illinois	1,069,634	0.1	4.7	12.2	15.2	32.8	35.0
Indiana	206,519	0.2	4.0	6.5	15.8	26.5	47.0
Iowa	248,225	0.4	13.8	31.6	24.7	9.2	20.3
Kentucky	67,820	0.9	14.8	....	36.4	6.1	41.8
Missouri	96,488	3.0	24.3	20.7	27.1	21.8	3.1
Ohio	227,967	1.0	22.6	18.3	35.9	0.1	22.1
Pennsylvania	1,055,485	0.2	7.7	10.3	19.9	9.4	52.5
Washington	93,957	1.0	5.4	19.8	14.2	50.3	9.3

Prefacing his presentation with a description of the rapid-sand filter, which is used by most city water departments, Mr. Turner declared that the chief function of the filtering medium was to remove, with the help of coagulating agents, where necessary, turbidity, color, matter offensive to the taste, and bacteria. Original research on anthracite as a filter medium was predicated on the thought that, as it was really a carbon and not a hydrocarbon, it therefore would stand considerable abrasion without reduction in size.

Filters must be backwashed from time to time to clean the filter medium. This is accomplished by forcing clean water up through the bed and thus expanding it. When sand is used, the bed tends to settle back with the coarser material on the bottom, due to the classification of the particles by sizes, because the specific gravity of all the grains is very nearly the same. Anthracite particles, however, have a greater diversification of shape and are composed of different constituents, with the result that the specific gravity varies widely between particles. Consequently, classification is not so marked, and the filter bed is more uniform throughout, so that all of it takes part in the filtration process. The angular particles also present a larger surface, have greater entrapping power and are more porous, thus increasing the filtering rate.

It is generally accepted that a 50-per cent expansion of the filter bed is necessary for thorough cleaning, the velocity of the backwashing water being of lesser importance. With anthracite, a 50-per cent expansion can be obtained with a much smaller backwash velocity (generally one-half), due to the lighter weight of the bed. The decrease in weight also is an important factor in the construction of portable filters.

Anthracite also is superior in the removal of bacteria from raw water, Mr. Turner asserted, and, in a number of cases, has definite advantages as an aggregate where chemically impure waters are used, such as in a boiler-water softener. Hot alkaline water dissolves the silica in sand, but, except for the relatively small quantity of ash, does not affect anthracite. In the lime-soda process of treating water, the sand grains become incrusted with calcium carbonate, with the result that it is very difficult to expand the bed, thus fouling the filter. Certain areas also may become cemented, materially interfering with efficiency. With anthracite, it has been found that, while calcium carbonate collects on the particles, the bond is not nearly so tight and the carbonate is easier to remove by backwashing.

Mr. Turner also cited experiments on the dewatering of material from the sewage digesting tanks at State College. With a sand bed, the sludge remained fluid over a long period, while it dried out relatively quickly on an anthracite bed.

Research, said Dr. H. H. Lowry, director, coal research laboratory, Carnegie Institute of Technology, offers a number of possibilities for bituminous coal, but considerable time will be required to realize them fully. Assuming the objective of the industry is to sell more coal at a better price without unduly burdening the public, Dr. Lowry recommended that research cover the elimination of the waste involved in smoke by the development of correct equipment for smokeless combustion or a smokeless fuel made from coal, as well as the fundamentals of the combustion process.

Long-distance trucking of coal introduces a new method of distribution which eliminates the railroad and wholesaler and retailer, declared Dr. W. H. Young, economic analyst, U. S. Bureau of Mines. In 1915, bituminous coal, "sold to local trade and used by employees" represented 2.8 per cent of the total output. This increased to 3.7 per cent in 1920, 5.2 per cent in 1931, and in 1932 was 6.6 per cent of the total production. This steady increase has been due in large measure to the rise of the truck, which has widened the radius of local distribution.

The two major factors favoring coal trucking are the relatively higher ton-mile rate on short railroad hauls and the gross margin of the retailer, which, together with the freight rate, is indicative of the margin in which the trucker can operate. Whether freight rates and retail margins are reasonable is immaterial, Dr. Young declared, as long as they are too high to hold the business. Widespread unemployment and idle trucks due to the depression also have been factors in the increase. In addition, according to some authorities, the truck has the advantages of quicker delivery, opportunity for inspection of the coal before delivery, delivery direct to the consumer's bin or the bunkers of the manufacturing plant and elimination of the necessity for keeping large supplies on hand.

Increasing evidence of the growth of trucking led the Bureau of Mines to request information on the movement in 1932, this information including tonnage moving ten miles or more by truck and also tonnage moving less than ten miles, which was classed as local trade. The 10-mile limit was adopted to allow comparisons with the horse-drawn wagon, which seldom exceeded this distance in the past. The results showed that 4,250,269 net tons of bituminous coal was moved ten miles or more by truck in 1932, or 1.4 per cent of the total output (Table I).

Analysis of the number of trucking mines for the ten principal states (Table II) shows that the majority were operations producing under 10,000 tons annually, though in Colorado, Indiana and Kentucky—Indiana, in particular—a significant proportion of the trucking mines were producing more than 50,000 tons per year (Table III). Mines under 10,000 tons (Table IV) generally ship the greater proportion of their output by truck. In general, mines in this class have no rail connections, while most of the large mines ship by both rail and truck. In fact, only two of the 89 mines in the ten states shipping over 50,000 tons had no rail connections. Pennsylvania Department of Mines reports show that 800,842 net tons of anthracite formerly moving by rail was shipped by truck in 1932, or 1.6 per cent of the production. While the percentage is small, the tonnage is of particular importance in the competitive situation in the immediately surrounding territory.

in Ten Principal States in 1932, by Sizes of Mines

25,000-50,000 Tons: Output, Tons	Trucked: Tons	Trucked: Per Cent	Over 50,000 Tons: Output, Tons	Trucked: Tons	Trucked: Per Cent	All Trucking Mines: Output, Tons	Trucked: Tons	Trucked: Per Cent
.....	.....	....	80,288	8,483	10.6	174,186	54,954	31.5
236,074	44,812	19.0	2,120,570	598,931	28.2	2,658,451	839,321	31.6
712,446	350,564	49.2	3,531,348	374,800	10.6	4,744,763	1,069,634	22.5
122,800	54,756	44.6	1,349,617	97,065	7.2	1,584,189	206,519	13.0
57,719	22,800	39.5	477,983	50,491	10.6	809,578	248,225	30.7
26,856	4,150	15.5	738,516	28,317	3.8	824,878	67,820	8.2
133,791	21,082	15.8	66,291	2,961	4.5	332,812	96,488	29.0
35,374	340	1.0	481,575	50,369	10.5	836,090	227,967	27.3
347,639	99,323	28.6	6,767,212	554,102	8.2	7,913,802	1,055,485	13.3
125,542	47,229	37.3	76,793	8,699	11.3	288,515	93,957	32.6

NOTES

. . . from Across the Sea

IS WET COAL wasteful of the heat of the flue gases in coking and does it lengthen out the coking period, is a question put by K. Baum in Report No. 52 of the Committee on Coking of the German Ironmasters' Association. It has quite generally been assumed that a high water content is wasteful both of calories and coking time. If perfectly dry coal is used, declares Herr Baum, the precarbonization products heat the coal to above 100 deg. C. and they issue at a much higher temperature than when the coal is initially wet. As long as the coal remains wet the gaseous products leave the charge at a temperature of about 100 deg. C.

Some coals which have a low coking quality are always thoroughly wetted before treatment in order to obtain a good coke, because the heating to the softening temperature, when it occurs, will then be as rapid as possible. Hence it is not well to use too dry a coal. Herr Baum declares that no heat economy in coking would be effected with certain coals by drying them before carbonization, because the products of pregasification should be expelled from the coal at temperatures below those of incipient softening. He says that Dr. H. Koppers contends that the gaseous products of distillation are sufficient to evaporate 5 to 10 per cent of water in the wet coal. Beyond such limits, the water must be evaporated by heat supplied by the combustion of the flue gases.

From graphs relating heat consumption and percentage of water, which cover a range of moisture content in the coal charged from 0 to 15 per cent, it would seem that about 6½ per cent of water in the coal as charged gives the lowest heat consumption.

A further effect of low water content, says Herr Baum, is to increase the work of reducing the temperature of the coke-oven gas. Data also show that the heat content of the gas from dry coke is much less than that of gas obtained from wet.

Herr Baum also gives data showing the effect of increased moisture on the time required for coking and presents a graph which shows that below 6.5 per cent moisture, changes in moisture content have a negligible effect on total coking time, but that above 8 per cent of moisture, the increase is quite pronounced.

WHERE a post is set on a steep inclination, it is usually not set at right angles to that inclination but with the top slightly up the pitch from a right angle, so that if the roof travels down the pitch relative to the floor, as it is usually assumed it will, it will tighten the prop, not loosen it. This is termed "undersetting" the prop. But doubts have arisen; does the roof always travel downhill more than the floor? E. H. Vallis was appointed by the Safety in Mines Research Committee of the North Staffordshire Institute of Mining Engineers to ascertain the facts, and he reports that sometimes the top travels uphill relatively to the floor. In short, it is a matter of "relativity." Table I shows his observations. It should be added that all the working places described are longwalls with long packwalls at right angles to the face and located at intervals and that the movement to which reference is made is that solely up or downhill. Other movement occurs to right or left at right angles to the dip.

Mr. Vallis declares that the softness of the bottom in Faces 4 and 5 may account for the relative movement of the roof to the rise of normal, as in each case where the movement of the roof was in that direction the floor was soft. He concludes that the manager of a mine should decide on undersetting only after considering (1) the effect which the shooting of the coal will have on the stability of the prop, and (2) the relative movement of roof and floor at the particular mine.

In the anthracite region, where pitching beds are common and the floor is hard, perhaps the undersetting of props is everywhere justified, especially as shots are heavy. In Washington State, where the coal pitches heavily, the floor is very soft and the shots are light, perhaps undersetting is undesirable. But it must be remembered that in both, room-and-pillar are generally used, and that "is something else again." Besides, in both regions, the props stand for longer periods than where longwall is used, as in the English examples cited.

Table I—How the Roof Moves Relative to the Floor

Face	Dip	Seam Thickness	Roof	Floor	Direction of Roof Movement Relative to Floor	Remarks
Faces up the Pitch and Advancing Along the Strike: "Strike Faces"						
1	14°	8 ft. 6 in.	Strong shale	Hard	3° to dip of normal	
2	18°	4 ft. 3 in.	Fairly strong shale	4 in. hard; soft beneath	1°16′ to dip of normal	
3	20°	4 ft. 3 in.	Fairly strong shale	4 in. hard; soft beneath	Along normal	
4	25°	3 ft. 9 in.	Banded sandstone	Soft	5°30′ to rise of normal	
5	28°	3 ft. 9 in.	Banded sandstone	Soft	11° to rise of normal	
Face Parallel to Strike and Advancing up the Pitch: "Rise Faces"						
6	20°	4 ft. 3 in.	Fairly strong shale	4 in. hard; soft beneath	Vertical, or 20° to dip of normal	Roof falls in wastes
7	18°	4 ft. 3 in.	Fairly strong shale	4 in. hard; soft beneath	1°20′ to dip of normal	Roof stands in wastes

A CAREFUL study of mine gases from Belgian mines has been made by the National Mining Institute, at Frameries, Belgium, a summary of which is given in the following table:

Percentages of Gases Found in the Gas from Coal

Gas	Minimum	Maximum	Average
Methane	92.9	99.6	97.0
Nitrogen	0.0	6.1	1.6
Carbon dioxide	0.03	3.38	0.84
Hydrogen	0.00	0.235	0.019
Helium plus neon	0.001	0.171	0.047
Ethane	0.02	2.79	0.53

The quantities of carbon monoxide, xenon and hydrogen sulphide are extremely small. It is impossible, says the institute, that the samples of gas escaping from the coal that were examined could have contained appreciable quantities of the last gas; none of them had any odor whatsoever. Moreover, not the least blackening of the mercury in air pumps has been observed, even after prolonged use. The institute adds that ethane is the sole hydrocarbon other than methane that it has been able to identify in 60 analyses, and that it is curious to note that the beds with the highest percentage of ethane are those which have instantaneous outbursts of gas. It suggests that where there is ethane there must be higher percentages within the bed, because all the samples in the deep sinkings show it and because the absorbed phase in equilibrium with the gaseous phase of 2 per cent must contain much more, and that rapid advance of workings may cause them to reach areas that are insufficiently bled of this gas. The sudden disengagement of these gases could lead to mechanical manifestations in the bed of greater or less intensity, and this possibility the institute proposes to investigate.

L. Coppens, of the institute, has obtained from the fermentation of paper a gas of the following analysis: carbon dioxide plus hydric sulphide, 58.55 per cent; methane, 40.99; nitrogen, 0.45; and hydrogen, 0.01 per cent; and from the fermentation of a plant found in sandy places an analysis: carbon dioxide plus hydric sulphide, 9.76 per cent; methane, 87.58; nitrogen, 2.66; and hydrogen, 0.00 per cent. This shows that it is possible to distill vegetal matter and obtain such gases as coal emits, in particular gas, free or almost free of hydrogen, though Oméliansky has declared that the presence of hydrogen is inevitable in such

fermentation. Testing stations are anxious to obtain synthetic firedamp that they can use in testing lamps, machinery and explosives. Removing the carbon dioxide and hydric sulphide, the percentage analyses are: methane, 98.89; nitrogen, 1.09; hydrogen, 0.02; and methane, 97.05; nitrogen, 2.95, respectively, compositions which A. Breyre, the administrator-director of the institute, says "strongly recall those of our firedamps."

R. Dawson Hall

On the ENGINEER'S BOOK SHELF

Requests for U. S. Bureau of Mines publications should be sent to Superintendent of Documents, Government Printing Office, Washington, D. C., accompanied by cash or money order; stamps and personal checks not accepted. Orders for other books and pamphlets reviewed in this department should be addressed to the individual publishers, as shown, whose name and address in each case is in the review notice.

Gob Fires, by T. N. Mason and F. V. Tideswell, Safety in Mines Research Board, British Library of Information, New York, N. Y. Part I—Explosions in Sealed-Off Areas in Non-Gassy Seams. Paper No. 75. Price, 30c. Part II—The Revival of Heatings by Inleakage of Air. Paper No. 76. Price, 15c.

These papers describe the experiments made in the British gob-fire building which has been treated already in S.M.R.B. Paper No. 34. To facilitate the control of experiments, modifications have been made in this building. For this reason the plant is redescribed in Part I. E. O. Simcock, of Stoke-on-Trent, England, was of the opinion that a gob fire could be most safely sealed if, without any prior attempt to subdue the fire, all roads leading to it were closed simultaneously by temporary stoppings. He believed it better to let the fire burn freely prior to the building of stoppings, even if the seam is gassy, thus enabling it to abstract oxygen so rapidly from the air that the atmosphere will become extinctive before much flammable gas can accumulate.

Experiments seemed to suggest that a blazing goaf fire in a restricted space is likely to burn most of the gases which the fire evolves, thus vitiating the atmosphere so that it cannot explode. In an extensive goaf, it is conceivable, the authors say, that an explosion might occur, especially if the fire is shielded. Any methane evolved from the strata would greatly increase that risk. An active fire in a roadside pack might form an explosive mixture during development of the fire, on sealing, or soon thereafter. A fire, small in comparison to area sealed, may form an explosive mixture, but probably not for many hours after sealing; therefore, a fire should be promptly and quickly sealed.

An inleakage of air which raised the oxygen content to between 5 and 7 per cent markedly increased the activity of the heating of a coal pile or dirt pack. However, conditions vary. A fire in a pocket of small-sized material in a dirt pack continued to burn and travel, without a gain in extent or intensity, for several weeks, even though the atmosphere was found to contain between 10 and 15 per cent of oxygen. On the other hand, on two occasions when the oxygen content rose from a very low figure to 3 per cent, the fire showed signs of revival.

In the United States, also, some have advocated letting the fire run before sealing, a suggestion the authors in this paper greatly question. It is generally recognized here that even a little oxygen will permit of sluggish combustion. It is, nevertheless, disconcerting to read the author's conclusions that the continued presence of only 1 or 2 per cent of oxygen in the atmosphere might maintain a heating indefinitely.

* * *

Falls of Roof in Mines Operating in the Pittsburgh Coal Bed, West Virginia, by J. W. Paul and J. N. Geyer. Technical Paper 547; 23 pp. Price, 5c. A Study of Roof Conditions in Pennsylvania Mines Contiguous to the Monongahela River, by J. W. Paul and J. G. Calverley. Technical Paper 550, 31 pp. Price, 5c. Both U. S. Bureau of Mines publications.

Of these two publications, the first covers the Fairmont and Panhandle districts, and, with the second, which includes observations at seven mines in western Pennsylvania, gives general coverage to most of the operations in the Pittsburgh bed. In the first is illustrated the method of covering roadways with steel rails or girders and lagging, and surmounting the latter with mine refuse or, preferably, ashes, which do not reach up at all into the cavity which falls of roof have made.

This method is not commended in the paper nor apparently is any comment made. It is an improvement on the same means of "support" without ashes or mine refuse, as it forms a bed for the falling roof and saves concentrated dynamic stress on the beam. but it leaves the roof without support, and, if the cross-sectional area above the refuse is not specifically ventilated, it forms a pocket for gas. If the mine refuse is road cleanings, the danger is enhanced, and when renewals are needed much refuse has to be handled; dangerous refuse if combustible. Ashes, which make a good bedding, are acid and in wet places therefore undesirable. At six out of seven of the mines in the second district, mechanical post pullers are used. Three of these mines set temporary safety posts against or near the face before blasting. In a Washington County (Pa.) mine, the cost of H- and I-beams and crossbars per ton of product is 4.5c. Other mines use much less steel and two none at all.

* * *

Character of Drainage from Mines in the Thick Freeport Coal Bed, Pennsylvania, by R. D. Leitch, W. P. Yant and R. R. Sayers. R. I. 3193, U. S. Bureau of Mines.

Of eighteen mines in the thick Freeport coal bed in Allegheny and Westmoreland counties, Pennsylvania, no acid water was found in seven, both acid and alkaline waters were found in eight, and three, which could not be entered for flooding, had acid outflows. From the eight mines having both acid and alkaline waters underground, 59 samples were taken, of which 32 were alkaline.

Coal, roof and bottom of this bed are relatively free of sulphur. Nothing is said in the report to show how much of the sulphur found is pyritic. That percentage probably is quite low, and to know how low is essential to any investigation of this sort. However, the total sulphur content of the coal runs from 0.80 to 3.57 per cent. Pyritic sulphur in the slate roof of one mine ran only 0.07 per cent and in the fireclay floor only 0.11 per cent. The high-ash section in the seam, which is thrown into the gob, contains only 0.87 per cent in one mine and is believed by the authors not to exert as great an influence in the acidification of the mine water as such gobbed material does in most mines.

All drippers are strongly alkaline, though the cover is great, without evidence of breakage to surface. Water from old workings and from the high-sulphur coal in the bottom is acid. Relatively large quantities of sodium and potassium salts and bicarbonates are held in solution in the drainage of the coal bed. Iron is present in smaller quantities than in the mine drainage of other areas. Iron phosphate was indicated in one analysis of shaft water (17.8 per cent of the solids being phosphorus pentoxide). A sump water in another mine had 192 p.p.m. chlorine. The bicarbonates in solution are credited by the authors with assisting in the prevention of acidification by neutralizing acid and by inhibiting the formation of sulphuric acid, for the bicarbonates react with the iron to form salts other than ferrous and ferric sulphates.—R. Dawson Hall.

OPERATING IDEAS

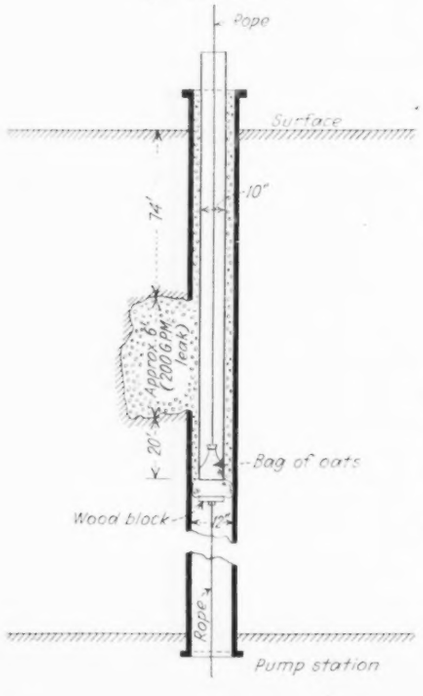
From Production, Electrical and Mechanical Men

Sealing Leak in Borehole

The accompanying sketch shows a method of sealing a leak in a 12-in. borehole at the No. 9 mine of the Irwin Gas Coal Co., Seward, Pa., through which a 500-g.p.m. centrifugal pump discharged to the surface. Some years ago, the presence of pieces of rock in the pump impeller led mine officials to believe that it was thrown into the borehole from the surface, but when screening failed to relieve the condition, the hole itself was investigated. As a result, it was found that a part of the hole had caved in at a point 74 ft. below the surface. The cave occured in a water-bearing quicksand, and was responsible for a leak of 200 g.p.m. into the borehole. Sealing was therefore necessary both to stop the leak and save the hole.

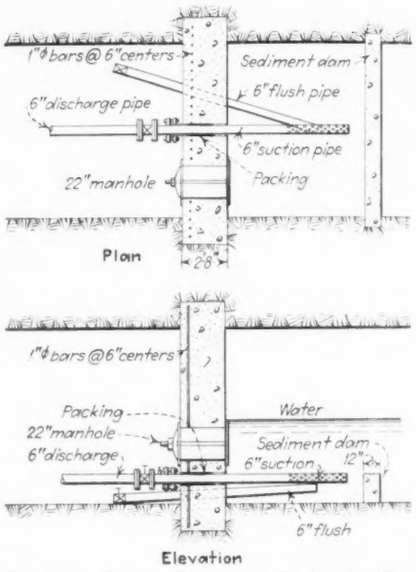
To seal off the caved section, it was decided to case the hole with a 10-in. casing to a point 20 ft. below the disturbed section. The casing was suspended from clamps on the surface, and, after centering, a bag of oats was employed to plug the hole in preparation for grouting from the surface down to the bottom of the casing. A $\frac{3}{8}$-in. wire rope long enough to reach from the surface to the bottom of the hole was run through the center of the empty bag. A round wood block with the same diameter as the casing was attached to the rope just underneath the bag, after which the bag was pulled to the top of the casing and filled with oats. Then, measuring along the rope, the filled bag was pulled down so that approximately three-fifths of it projected below the bottom of the casing. A pull from the surface then bulged the bag out around the bottom of the casing with the help of the wood block, and further swelling of the oats due to the presence of water resulted in a tight seal all around the casing end. The hole was then grouted to the surface and, after standing for several days, was put back in service with a reduced diameter but with leakage from the caved area eliminated.

Method of Sealing Off Caved Section in Borehole



Concrete Water Dam

The revised code of standards of the Union Pacific Coal Co., Rock Springs, Wyo., recommends the use with sumps of the concrete water dam shown in the accompanying illustration. The suction pipe, according to the code, should be installed about 12 in. above the floor of the sump and should pass through the dam in a suitably packed joint. In no case should it be grouted solidly. Provision also is made for the installation of a suitable drain pipe, which is placed so that its inlet is directly under the strainer on the suction intake in the sump. By opening the valve on this drain suddenly, any sediment around the strainer would tend to be dislodged. A low wall also is provided, as shown in the illustration, for holding back the major part of the sediment from the suction inlet.



Concrete Water Dam With Flush Pipe and Sediment Dam

Safety Shotfiring Methods

D. J. Parker, district engineer, U. S. Bureau of Mines Safety Station, Salt Lake City, Utah, in Information Circular 6743, describes an unusual method of charging shotholes and handling misfires at the Columbia (Utah) mine of the Columbia Steel Co., a subsidiary of the United States Steel Corporation. All coal is blasted with permissible explosives electrically detonated from the surface after all the men are out of the mine. All blasting, including inspection and measurement of the shotholes, charging, wiring and inspection after firing, is done by shotfirers.

In charging individual shotholes, primers are made up by inserting detonators into the ends of the cartridges. The cartridge paper is tied around the detonator wires, which are then half hitched around the

cartridge. Where two sticks of explosive are used, the primer is inserted in the hole first; where three sticks are used, the primer is placed in the center of charge. Individual cartridges are not pushed to the bottom of the hole as they are inserted but the charging system is so arranged that when the charge is complete the end of the last cartridge is flush with the mouth of the hole. The entire charge is then pushed home with a wooden tamping bar. This eliminates air gaps between cartridges, which might cause misfires, due to the fact that where the holes are not well cleaned, drillings are likely to get between individual cartridges when they are shoved home separately. The end of the primer containing the detonator is placed next to the bottom of the hole, thus directing the sensitive end of the detonator toward the bulk of the charge.

When misfires occur, all wiring is disconnected from the detonator legs, which are then short-circuited by twisting the ends together. The stemming is then removed by washing it out with the hose with which every working place is provided for sprinkling the coal. When the primer is placed in the bottom of the hole, it is a comparatively easy matter to pull out the entire charge by using the detonator wires. On the succeeding shift, the hole is charged with a new primer and fresh explosive. The primers removed are not used again, unused primers being taken outside and exploded.

Cash In

Don't let your ideas go to seed. That new mechanical, electrical or safety short cut you have worked out may help other operating men who are faced with a similar problem and may be worth actual money to you. *Coal Age* wants practical ideas of all kinds for the benefit of its readers, and is willing to pay $5 or more each for those that prove to be acceptable. Send in yours. No special writing ability is necessary—just a clear explanation of the idea. A sketch or photograph often will make the item more interesting and understandable.

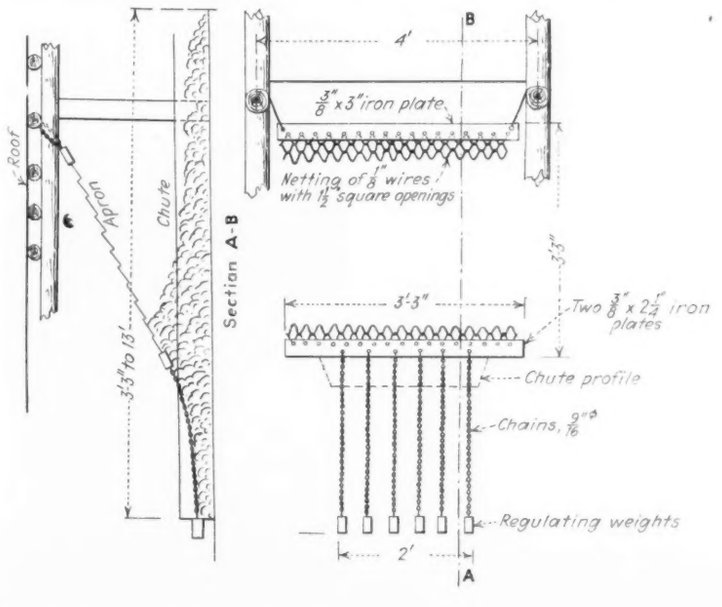
Retarding Coal in Chutes

The accompanying sketch shows a method of retarding the flow of coal in chutes on a longwall face in the Mère des Veines bed, Sacré-Français operation, S. A. des Charbonnages Réunis (Mambourg), Charleroi, Belgium, as reported in the *Annales des Mines de Belgique*, Vol. 33, Sec. 2, 1932. The thickness of the bed is about 2½ ft., and the longwall face extends up a pitch varying from 21 to 29 deg. Use of the retarding device was dictated by a desire to reduce danger from flying pieces of coal, loss of coal in the gob, breakage, formation of dust clouds and the upsetting of posts.

The longwall face referred to is served by two lines of stationary chutes, and with the existing pitch it was found that if the coal was not checked, the velocity became so great that it would fly out of the pans. Gates operated by the workmen were first tried, but lack of coordination in their operation was a source of interruption of work along the face. Consequently, the retarding device shown in the illustration was developed, and a number of these were placed at regular intervals along the course traveled by the coal. The curtain, or "coat of mail," of wire netting serves to arrest pieces of coal which may leave the pan and fly through the air. For checking the coal in the chute, the curtain is prolonged by the addition of chains with weights on the ends. These rest in the trough of the chute.

The types, dimensions and weights of the regulating means are dependent upon the character of the coal, the profile of the trough and the inclination of the bed. By varying the interval between the retarding devices, as well as the regulating weights, both the speed of delivery of the coal and the quantity retained back of each can be adjusted to suit conditions.

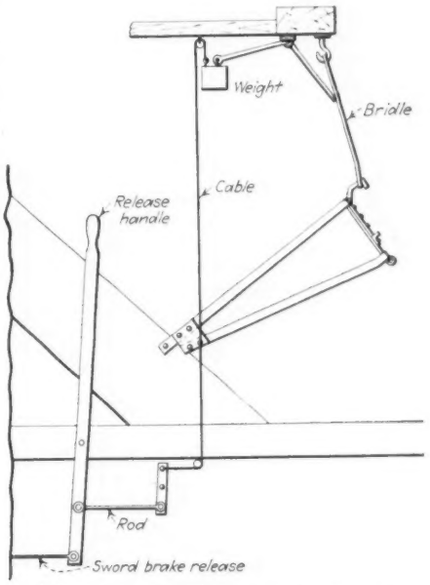
Construction and Application of Retarding Device for Conveyor Chutes



Brake Release Lifts Weight To Lower Bridle

Lift end-gate cars and a crossover dump were selected for the new No. 4 mine of the Pond Creek Pocahontas Co., Bartley, W. Va., which brought up the problem of automatic equipment for lifting the end gate. Such equipment, mine officials felt, should drop automatically to engage the end-gate hook and also release the hook automatically to allow the empty car to run off the dump. Furthermore, operation should be positive, and attention and adjustment kept down to a minimum.

As no tried and proved equipment came to the attention of the officials, they proceeded to make the lifter shown in the accompanying illustrations to fit their conditions. In operation, the bridle normally is held out of the way by a weight-operated arm. This arm rests against the bridle but is not connected to it. The weight is connected to the sword release lever of the dump brake through a system of ropes, rods, levers and pulleys. When the dump brake is released, the weight is lifted, allowing the bridle to drop down. This movement is timed so that the bridle engages



Diagrammatic Sketch of the No. 4 Gate-Lifting Mechanism

Dumping a Car at Pond Creek No. 4 Mine

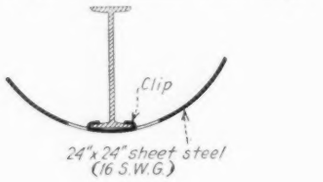
the end-gate hook at the proper moment. After the empty car returns to normal position, the weight jerks the bridle out of the hook and raises it to an almost horizontal position.

Guard for Low Beams

An item describing the use of jointed, wooden trailing members in the Coaldale breaker of the Lehigh Navigation Coal Co. to warn tall men of the presence of low beams, which appeared in the September *Coal Age* (p. 312), moves W. J. Leonard, North Broomhill, Morpeth, England, to offer the guard shown in the accompanying illustration. The guard is made of a 24x24-in. piece of sheet iron (16 S.W.G.) suitably curved, and is clamped to the I-beam with clips punched out of the metal itself or by countersunk bolts and washers on the top side. For other types of beams, other suitable fasteners may be employed, and the length of the guard may be extended if necessary.

It is obvious, says Mr. Leonard, that there is much less possibility of injury as a result of a man forgetting to duck and striking his head against this flexible guard than in coming in sudden contact with the sharp edge of a solid I-beam. In addition to its effectiveness, cheapness is another major advantage cited by Mr. Leonard.

Guard Applied to I-Beam With Clips



Explains Why High Voltage Is Not Always Fatal

Most electrical men are aware of instances where persons have been killed by coming in contact with conductors carrying comparatively low voltages—110 or 250 volts, for instance—while others receiving shocks at voltages of 6,600, 11,000 or even higher have lived. Apparently, some unknown factor enters into the picture, with the result that some explain the phenomenon by laying it to weak hearts, while others emphasize the degree of contact, with especial stress on the moisture present at the point of contact.

Still other electrical men believe that deaths at low voltage are due, in many cases, to the fact that a shock is not received until a tight contact is established—for instance, until a man completely closes has hand over the conductor, muscular contraction then causing him to hold the contact for an appreciable time. In the case of high voltage—11,000, for instance—the shock is experienced before actual contact, it is believed, due to the fact that the current will jump a small gap, even through dry air. This paralyzes the muscles, and the victim drops away from the conductor in a fraction of a second.

A third explanation of the phenomenon, based on experiments with animals, is now offered in an article on "Resuscitation by Countershock," in the July, 1933, *Electrical Engineering,* published by the American Institute of Electrical Engineers. The opening paragraph of the article, by W. B. Kouwenhoven and R. D. Hooker, Johns Hopkins University, is as follows:

"It is well known that an electric shock causes muscular contraction, and that this contraction is greater for high voltages than for low voltages. When a small 60-cycle alternating current passes through the heart, experience and experiment show that it apparently is not great enough to inhibit heart action entirely, but sufficient only to destroy the regular, coordinated muscular activity of that organ, with a result that ventricular fibrillation is induced. When the ventricles of the heart go into fibrillation, the activity of the cardiac musculature no longer is coordinated and a cessation of blood circulation results. The human heart, as well as that of certain animals, such as the dog, seldom recovers spontaneously from fibrillation. Death, therefore, usually results. Thus ventricular fibrillation is believed to be one of the principal causes of fatalities in cases of low-voltage electric shocks, and of the failure of the victim to respond to artificial respiration."

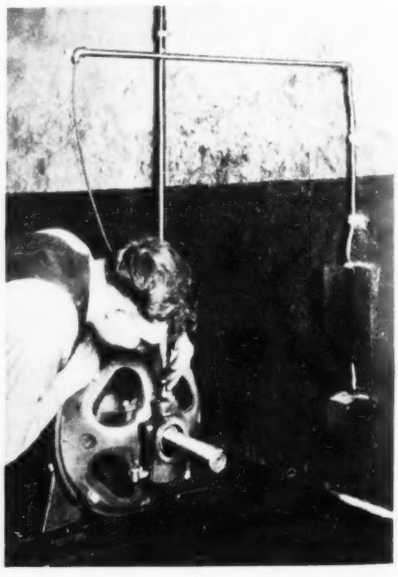
Experiments indicate that fibrillation, or twitching of the ventricles, does not take place when a large current flows through the body, and that fibrillation from a small current can be stopped by a countershock with high voltage. The high-voltage shock, be it either the first or a countershock, brings the heart muscles completely to a stop for some seconds, after which the heart will resume rhythmical beating.

In experiments with dogs under anesthesia, a countershock brought the heart to rest in 19 out of 22 cases, and in 16 the heart resumed proper action. If, however, fibrillation prevails for more than two minutes, recovery is difficult. These findings indicate that fibrillation from small currents may be the best explanation of the mystery of deaths from low voltage, as well as some recoveries from high-voltage shocks. There also is a possibility that countershock may be developed as a practical method of treatment in certain cases.

Small Trouble Light

For examining small parts in equipment to be repaired or inspected, the Westinghouse Electric & Mfg. Co. has installed the peep-hole light shown in the accompanying illustration at its East Pittsburgh (Pa.) works. With it, the repairman is able to inspect thoroughly the bearings, oil rings and small parts of motors and other equipment without disassembling them. The light is made from an ordinary fountain-pen type flashlight and is attached to a flexible cord suspended from an arm installed in a convenient position over the work bench. Current is supplied by a small transformer mounted on the wall. When not in use, the light is placed in the clip on the end of the arm and swung to one side out of the way.

Inspecting a Motor Bearing With the Peep-Hole Light



WORD from the FIELD

Relief Administration to Buy 10,000,000 Tons of Coal

Anthracite and bituminous operators have agreed to furnish 2,000,000 tons of hard coal and 8,000,000 tons of soft coal for the needy unemployed through the Federal Surplus Relief Corporation at substantial price reductions, according to an announcement Dec. 1 by Harry L. Hopkins, president of the corporation and federal Civil Works Administrator. Members of the Anthracite Institute have agreed to a concession of 70c. a ton, and bituminous code authorities have consented to a cut of 10 per cent from code prices, effective Dec. 1. Distribution plans contemplate purchase of coal of standard size and quality in sizes and kind best adapted to the heating equipment, and for providing hard and soft coal, respectively, in the areas in which each is normally used.

The coal will be supplied by dealers from existing stocks through arrangements made by local relief administrations. The quantity will be relayed through the state relief administration to the Surplus Relief Corporation, which will instruct either the Anthracite Institute or the appropriate bituminous code authority to ship replacements. Orders will be allocated among operators by the institute or code authorities. Retailers generally have agreed to deliver the coal at cost as their contribution to the relief program, and special rates have been made by the railroads.

New Preparation Facilities

New contracts for preparation facilities at various coal operations were reported as follows in November:

Allegheny River Mining Co., Kittanning, Pa.; contract closed with the Roberts & Schaefer Co. for four-track all-steel tipple and headhouse. Equipment includes feeder, car control and cager, rotary dump, belt conveyor, Marcus screen and loading booms. The contract also includes installation of a Hydrotator Co. air-sand plant for treating 2x¼-in. coal. Over-all capacity of the plant is 250 tons per hour; capacity of the air-sand plant is 100 tons per hour.

East Bear Ridge Colliery Co., Mahanoy Plane, Pa.; contract closed with the Hydrotator Co. for one 7-ft. Hydrotator complete with the necessary conveyors, shakers, hoppers and chutes for cleaning rice and barley; capacity, 50 tons of clean coal per hour; and one 5-ft. Hydrotator, including the necessary auxiliary equipment, for cleaning No. 4 buckwheat; capacity, 15 tons per hour. Both units are to be installed by Jan. 1.

Fidelity Fuel Co., Inc., Shaft, Pa.; contract let to the Chance Coal Cleaner for installation of one 15-ft. Chance cone for cleaning all sizes of anthracite. Potential capacity of the plant, which probably will go into operation in January, is 150 tons per hour, though immediate output will be 200 to 300 tons per day of sizes smaller than stove.

Hume-Sinclair Coal Co., Hume, Mo.; contract let to the McNally-Pittsburg Mfg. Corporation for remodeling existing tipple to increase capacity from 300 to 400 tons per hour. The work will consist of enlarging main shaker screen and feeder, lengthening three picking tables and booms, and adding one picking table and one boom to provide two tables for lump, as well as facilities for loading it on two tracks.

Panther Coal Co., new operation at Hurley, W. Va.; contract closed with the Jeffrey Mfg. Co. for tipple equipped with raw-coal hopper, apron conveyor for delivering coal to the shaker screens, picking tables and loading booms for lump, egg and nut and the Jeffrey system of electrical control. Shaker screens consist of one pair of balanced, slow-speed primary screens for lump and egg and one pair of balanced, high-speed secondary screens for the nut sizes, all installed as a self-contained unit and driven from the same motor. Coal is brought to the tipple by an American Steel & Wire Co. aerial tramway. Capacity of the tipple is 300 tons per hour, and provisions have been made in the design for future installation of high-speed vibrating screens for sizing slack, as well as for mechanical cleaning equipment.

Coal Production Up

Bituminous coal production rose to 30,435,000 net tons in November, according to preliminary figures compiled by the U. S. Bureau of Mines. Production in October was 29,656,000 tons, and the output in November, 1932, was 30,632,000 tons. Anthracite production rose to 4,806,000 tons in November, against 4,711,000 tons in October and 4,271,000 tons in November of last year.

Total production of bituminous coal for the first eleven months of 1933 was 298,193,000 tons, an increase of 23,636,000 tons, or 8.6 per cent, over the output of 274,557,000 tons in the same period of last year. Anthracite output in the first eleven months was 44,970,000 tons, an increase of 709,000 tons, or 1.6 per cent, over the 1932 total of 44,261,000 tons.

Southern Appalachian Operators Hold Annual Meeting

The coal code and wagon mines were the chief topics of discussion at the annual meeting of the Southern Appalachian Coal Operators' Association at Knoxville, Tenn., Nov. 17. Asserting that antagonism will benefit no one, E. C. Mahan, president, Southern Coal & Coke Co., asked all operators to cooperate to receive the maximum possible benefits. The code offers some measure of profit, and this should offset any annoyances growing out of its provisions. Fair dealings with labor in strict accordance with the code are necessary, Mr. Mahan declared, and differences over prices should be settled locally to avoid action by outside authority.

Echoing Mr. Mahan's statement that the coal code offered possibilities of substantial advantages, R. E. Howe, secretary-treasurer, Appalachian Coals, Inc., turned to a discussion of the wagon-mine situation. At the present time, he said, there are 1,200 wagon mines operating in the southern high-volatile subdivision of Division I, producing 36,000 tons per month. It has been ruled that these mines must pay code wages and sell at code prices. Code authorities are now checking up on these operations with the idea of determining the transportation charges to be added to the mine price. W. E. Gunter, secretary of the association, stated in his annual report that the chief inspectors of both Kentucky and Tennessee have promised to require a certified foreman at each such operation.

Officers were chosen for the coming year as follows: president, S. M. Reams, president, Clear Fork Coal Co., Middlesboro, Ky.; vice-presidents, W. G. Polk, vice-president, Block Coal & Coke Co., Knoxville, and J. B. Gatliff, president, Gatliff Coal Co., Williamsburg, Ky.; secretary-treasurer, Mr. Gunter.

Wheeling Township Builds Power Plant

Wheeling Township Coal Mining Co. put a new power plant in operation at its Somers mine, Adena, Ohio, late in November. Equipment includes the following: two 300-hp. Stirling-type boilers fired by B. & W. forced-draft stokers; Jeffrey fuel- and ash-handling equipment; two 500-kw., 4,000-volt, 60-cycle, Allis-Chalmers turbo-generators, one of which is held in reserve; Westinghouse Terrill voltage regulator; Allis-Chalmers, 1,000-sq.ft., welded-steel surface condensers with Crowell-Reynolds evactors and Allis-Chalmers hot-well pump; Allis-Chalmers turbine-driven pumps for circulating condensing water; Union Steam Pump Co. reciprocating boiler-feed-water pumps; and a 2,500-hp. Hopps feedwater heater.

Demand for Equalization and Higher Wages Features Anthracite Code Hearings

Economic realities and social demands met in head-on collision at the hearings on the proposed code of fair competition for the anthracite industry held before Deputy Administrator W. H. Davis of NRA at Washington, D. C., Nov. 17. Spokesmen for communities dependent upon mines closed down because of high costs of operation joined with representatives of the United Mine Workers in insisting that the proposed code (see November, 1933, issue of *Coal Age*, pp. 386-387) be modified to provide for flat equalization of running time at all collieries under the control of a single producing company.

The 30-hour week, with no reduction from the basic day rates now written into the wage agreements between the operators and the unions, also was proposed as a substitute for the limitations on hours suggested by the anthracite code makers. Sharp curtailment of stripping and the working of culm banks and washeries was advocated on the ground that such curtailment would spread employment. Proponents of these changes, however, offered no information on how the higher costs which the changes would entail could be made acceptable to the consumer.

But Charles F. Huber, chairman of the code committee of the operators, as if in anticipation of this question, declared that anthracite production in 1932 fell to the level of forty years ago, not merely because of the depression but as a result of acceleration in a shrinkage in markets which began several years prior to 1929. Prices paid for anthracite by the household consumer in comparison with those asked for competing fuels, he testified, played a significant part in the anthracite decline.

With wages frozen at the highest levels in the history of the industry, he continued, management has been diligent in seeking to reduce costs in the 40 per cent area not controlled by wage contracts and since 1924 has succeeded in cutting total operating costs approximately 75c. per ton. During the same period, however, average mine prices have been cut more than $1 in an effort to check competitive inroads. With an operating loss of nearly $20,000,000 for the eighteen months ended June 30, 1933, further reductions in prices without compensating reductions in costs cannot be expected.

Summarizing the situation, Mr. Huber said that "employment has shrunk as markets have shrunk and employment cannot be increased unless markets can be expanded. Prices now in effect provide an inadequate return and the industry's financial condition is precarious. High-cost collieries have been closed of necessity, and spreading work to include such closed collieries is economically impossible under existing conditions. Any policy which increases anthracite costs is certain to accelerate the present trend of declining markets and decreasing employment."

Turning to specific provisions of the code, he explained that the minimum wages named for employees not covered by union contracts correspond to the minima set forth in the President's Reemployment Agreement. Exceptions to the maximum 48-hour week, he said, were of a nature familiar to NRA. The minimum age limit is in accord with Pennsylvania state law. Art. VII of the code, covering prices and terms of sale, is "probably the most important provision from the standpoint of carrying out the purposes and intent of a code of fair competition."

Sec. 7 of this article, to which the Lehigh Valley Coal Corporation and the Philadelphia & Reading Coal & Iron Co. had refused to subscribe, was an adaptation of one of the provisions of the iron and steel code. It provides, Mr. Huber explained, that the code authority, subject to Presidential approval, may prevent sales prices and policies which tend to evade or violate provisions of the code "or which, having due regard for the good of the industry as a whole and the purposes of the act, would constitute unfair competition.

"If the code authority is to be without power to inquire into the prices at which companies separately sell their product, unrestrained and unfair competition will continue. The fact that this condition has existed in the industry for a long period of time prompted the proponents of this code to insert Sec. 7* of Art. VII. Unless the code authority is granted the police power contemplated by this section, there is little hope that a code will be of material benefit to the industry or to those it employs."

Leading the opposition to this section, A. J. Maloney, president, Philadelphia & Reading Coal & Iron Co., expressed approval of the open-price policy embraced in Art. VII, but objected to what he termed "the price-fixing" provisions of Sec. 7. He proposed the substitution of a code authority throughout the article for the committee named in the draft submitted NRA and asked that everything in Sec. 7 after the first sentence be stricken out. His amendment also specified that prices should be published as well as filed with the code authority.

These changes, he insisted, would eliminate the unfair trade practices which have crept in during the depression and yet encourage a wholesome rivalry "which would retain that initiative and enterprise

*Sec. 7 reads as follows: "The committee shall have the power on its own initiative, or on the complaint of any operator, to investigate all facts and circumstances pertinent to the prices, terms, or sales policies filed by any operator with the institute, and for the purpose of the investigation to require said operator to furnish such information as the committee shall deem necessary or proper. If the committee, after such investigation, shall determine that any such filed prices, terms, or sales policies constitute evasions or violations of any of the provisions of this code, or tend to defeat the purposes of the act, and may result in unfair competition, the committee shall require said operator to file revised prices, terms, and sales policies in whole or in part; and if said operator shall not file such revision within 10 days after such notice of determination, the committee is authorized, in behalf of said operator, to file a revision of the objectionable items with the same force and effect as if said revision had been filed by said operator; provided, always, that any prices, terms, and/or sales policies filed by the committee shall be subject to the approval of the President before the operator affected shall be governed thereby."

C. F. Huber
Spokesman for Anthracite Code

so essential to service to the consumer and to vigorous economic health in the industry. An individual operator, faced with his own internal problems and confronted with the task of holding a given market, will not suffer from the handicap of rigid prices.

"At the same time, results in the form of fair and uniform prices to customers of an operator in a given territory should prevent in the retailing end of the business those disturbances which the uneven pricing by that operator originates. The policy should prevent an operator from attempting to entice customers away from a competitor by granting them prices below those charged others. The added stability will be conducive to expanded markets for anthracite."

Price fixing is unnecessary in such a compact industry as anthracite, declared L. R. Close, president, Lehigh Valley Coal Corporation. Moreover, the tendency would be to fix prices too high and so injure the industry. The code, he added, provides no yardstick by which to measure prices fixed. If the industry has suffered from price cutting, it is due to secret departures from published prices. Such departures would be prevented by the open-price policy.

Fred L. Pinolea, vice-president, Sterrick Creek Coal Co., felt that the smaller operators should not be compelled to adhere to the schedules named by their larger rivals. The latter, he argued, have advantages in retail connections and distribution machinery which the smaller producers must offset by lower mine prices. He suggested that Art. VII be amended to provide that, if in the opinion of the code authority or the President, the disputed article should operate to discriminate against the smaller producers, the code authority and/or the President would be authorized to allot tonnages and fix prices.

W. A. Clark, vice-president, National Retail Coal Merchants' Association, who had already objected to phraseology in other sections of the code which might be construed as attempts to put regulation of the retail industry under the control of the operators, doubted whether Sec. 7 would have the stabilizing influence claimed for it. He, too, wanted powers under the code lodged with a code authority and not

with a committee. Inspection of published prices, he added, should be open to all persons. Standards of sizing and quality (Art. VIII), he argued, should be definitely incorporated in the code and should not be subject to change except on approval of the code authority. Arthur Hale, commissioner, American Wholesale Coal Association, supported Mr. Clark in his protest against attempts to define retailing and wholesaling functions in the code.

On behalf of the United Mine Workers, Thomas Kennedy, international secretary-treasurer, offered a nine-point program covering labor provisions which the union believed should be incorporated in the code. The gist of these proposals was:

1. Specific incorporation of the minimum rate of $4.62 per day for outside labor in the code, with provision for maintaining recognized relationships in rates for other classifications of labor.

2. Establishment of a maximum 6-hour day and 30-hour week—except for supervisory, technical and confidential personnel—without reduction from present base rates now paid for 8 hours per day, and with flat prohibition of overtime.

3. Equalization of running time.

4. Payment of net amount of wages due semi-monthly in lawful money or par check, with check-off.

5. Abolition of individual contract mining.

6. Restriction of stripping, washery and culm-bank operations to work carried on in conjunction with underground mining and to the same number of hours underground operations may work; modifications may be made where all collieries of any given company are working.

7. Prohibition of the substitution of monthly men, bosses or others for regular employees during idle days or previous to shutdowns to do work normally performed by said regular employees.

8. Prohibition of the employment of persons under 18 inside a mine or at hazardous occupations outside and employment of workers under 16 years of age outside a mine or colliery.

9. Incorporation of definite statement in code that provisions of paragraphs *b* and *c*, Sec. 2 of Art. IV (covering wage rates based on President's Reemployment Agreement) are not to be construed as affecting rates of pay for employees covered by union wage agreements.

Unemployment conditions in the anthracite region, said Mr. Kennedy, involve two major problems: "(1) The present emergency unemployment due to the general depression, and which must be regarded as transitional in character; and, (2) more permanent unemployment arising from the stabilization of the industry and possible changes in the uses and distribution of anthracite." Shorter hours, prohibition of employment of new workers until all former employees have been put back on the payroll and equalization will contribute toward meeting the immediate emergency problem.

As steps in a permanent program, Mr. Kennedy renewed his recommendations for (1) equalization of work; (2) the shorter work-day and work-week; (3) restriction on stripping operations and hours of work for such projects; (4) drastic curtailment, if not elimination, of loading of culm banks "during this emergency"; and (5) prohibition of taking on any new men while former employees are out of work. In addition, he suggested:

6. Joint recommendation for the establishment of old-age pensions by the State of Pennsylvania, and the payment of compensation to those disabled by the industrial disease of the industry, known as miner's asthma, the medical terms of which are anthracosis and silicosis or both.

7. Establishment of a board under the code to study and report upon practical plans for the permanent equalization of the work and the stabilization of the industry.

With operations in some sections of the region down for two to three years as a result of the policy of larger companies in concentrating production at low-cost collieries, declared Mr. Kennedy, "the sufferings of our people have been indescribable and without precedent in other industrial communities. The limits of human endurance have long since been passed. The recurrent upheavals of recent weeks in anthracite areas are but the expression of the desperate straits to which many communities have been reduced through several years of abandonment—without earning power and with no means of support remaining, not only to mine workers but also to merchants, professional men and all other classes directly or indirectly dependent upon the anthracite industry."

Thomas Kennedy
Spokesman for labor changes in Code

In a supplemental statement Mr. Kennedy protested against the action of some operators in inaugurating a system of physical examinations applying to all new applicants and also to employees who had been idle 60 days or more. This system, he charged, "in reality is used as a weapon of discrimination against persons without good reason and deprives them of employment." He also accused some companies of a deliberate attempt to get rid of the older men in the industry. Asked by Deputy Administrator Davis whether physical examinations should be eliminated the witness stated he would submit recommendations on the question later.

Mr. Kennedy's demand for equalization of running time was reechoed by several witnesses who followed him on the stand. Daniel Guinan, speaking for local NRA boards in the southern region, not only wanted equalization but also asked for a 6-hour day with a minimum rate of $1 per hour. He supported the plea for restrictions on stripping and washeries. Any mine closed down for a year should be considered as permanently abandoned by its owners and should be taken over and operated by the state or NRA.

Testimony of the same general tenor was offered by the Rev. J. A. Pounder and by James H. Gildea, chairman of the equalization committee of the Panther Creek Valley. The last named witness submitted cost sheets and other data based, he said, on figures covering Lehigh Navigation Coal operations in support of the plea for equalization. The valley, he asserted, would not endure another winter of idleness and 3-cent relief meals. John Sabole, appearing for men formerly employed at the Loree and Boston collieries, also voiced the demand for equalization and assailed the individual contract system as destructive of wage standards.

C. J. Dougherty, speaking for the rock men of the Panther Creek Valley, attacked the private contract system on tunnel work, charging that the men so employed were compelled to do twice as much work as formerly because independent contractors used obsolete and outmoded equipment. He asked that the rock men be employed directly by the coal companies and that standard rate sheets for this work be established. Rinaldo Cappellini, one-time president of District 1 of the United Mine Workers and now affiliated with the insurgent union, asserted that 90 per cent of the men in the district had deserted the older union because of abuses by the operators and neglect by union officials. He asked that NRA take no final action on the code until the report of the committee sent by the National Labor Board to investigate conditions in the region was available. John Boylan, president of District 1, challenged the inference that the new union represented 90 per cent of the men in the northern field.

Fred I. Blase told NRA that operators discriminated against men who complained of conditions; equalization, he stated, would prevent such tactics. He also opposed the check-off system and said that the union should collect the dues directly from its members. Prof. M. J. Lloyd testified that the Glen Alden mine at Taylor had been idle nearly three years and that conditions in that borough were desperate. John D. O'Donnell, NRA Labor Advisory Board, asked for a flat minimum for office employees without regard to population limitations.

Attacks on Art. VI of the code to the extent that it might limit the area of trucking operations were made by Joseph E. Gehringer, Lehigh Valley Independent Coal Merchants' Association; Darlington Hoopes, Berks Buyers, Inc., and Mr. Pinolea. They were supported in this position by W. L. Chandler, representing the Consumers' Advisory Board of NRA. Mr. Kennedy stated that labor wanted representation on any code authority set up.

Since the close of the public hearing, conferences have been held between NRA officials and representatives of the anthracite interests to discuss the situation in the light of the testimony developed. Conferences between representatives of the union and of the operators to consider the provisions which labor wants incorporated in the code were scheduled to begin in Washington on Dec. 4.

Soft-Coal Code Organization Completed; Presidential Appointees Named

With the naming of Presidential appointees to the various divisional and subdivisional code authorities and the selection of divisional Bituminous Coal Labor Boards and the major part of the membership of the National Bituminous Coal Industrial Board, organization for code operation in the soft-coal industry was practically completed in November. Three optional places on the industrial board in addition to the Presidential appointees on the five divisional code authorities and the nine operator representatives (Division I, 4; Division II, 2; Divisions III, IV and V, 1 each) were yet to be filled at the end of the month after a clash between General Johnson, NRA administrator, Secretary of Labor Perkins and John L. Lewis, president, United Mine Workers, over the question of labor representation on the board. Both Secretary Perkins and Mr. Lewis insisted on such representation, but General Johnson originally proposed himself; F. G. Tryon, head, statistics section, U. S. Bureau of Mines, and Federal Judge George W. Anderson, Boston, Mass., as appointees.

Alabama protested vigorously against the designation of Monte Lehman, an attorney of New Orleans, La., who later refused the appointment, as Presidential member of the code authority for Division III, and also against Judge A. D. Acuff, Jasper, Ala., the impartial Presidential representative on the divisional labor board. Operators complained that the NRA was showing lack of consideration for the state's problems, and on Nov. 25, D. A. Thomas, chairman of the division code authority, announced that in the absense of fairer treatment the membership would resign. However, appointment of Herbert S. Salmon, a consulting engineer of Birmingham and the choice of the operators, resulted in a material improvement in feeling late in November.

Indiana operators also insisted on a representative from their own state on their subdivisional code authority, and were successful in securing the designation of Gilbert W. Gambrill, an attorney of Terre Haute, after the appointment had been refused by Frank C. Woodward, dean of the law school, University of Chicago.

Discussion of the question of who would pay the salary and expenses of Presidential appointees and other members of the code authorities and labor boards entered another phase with a ruling by the NRA on Nov. 29 to the effect that each code authority assess each producer a sufficient sum to return "(a) the salary of the Presidential member of its divisional labor board and the salaries and expenses of the Presidential appointees on its divisional and subdivisional code authorities" and "(b) the salary, if any, of the employers' nominee on the divisional board, and one-half of the expenses of the divisional labor board, the other half to be contributed by the representative of employees."

In view of the benefits growing out of the price-control provisions of the code, the NRA was hopeful that the ruling on administrative expenses would meet with little objection. Previous opposition among operators to the payment of government representatives, particularly those charged with the duty of protecting the public's interests, by the industry and probable difficulties in collecting assessments from operators not subscribing to the code either as individuals or through associations introduced an element of uncertainty, however. Also, the United Mine Workers were reported to be against payment of half of the expenses of the labor boards, though they were represented as disposed to view the matter in a different light, provided they were granted the check-off in all fields.

While code operation in November brought forth some reports of chiseling by certain of the larger operations in the various fields, the major problem facing most code authorities was the regulation of wagon mines. Sales by these operations at lower than code prices and the absence of a definite ruling on truck quotations by the NRA were reported to be disturbing factors of serious proportions in a number of divisions. A further complication was the physical difficulties involved in bringing wagon operations under control. Western Pennsylvania, however, furnished an exception to the general rule. Owners of 1,000 wagon operations in this field were reported to have appointed a committee late in the month to assist the subdivisional code authority in enforcing minimum code prices. The committee is headed by C. F. Hosford, Jr., who resigned as president of the Butler Consolidated Coal Co. early in November.

Truck movement of coal also gave rise to the first action taken against alleged violators of the provisions of the bituminous code. The Moore Coal Co., Putnam County, Missouri, near the Iowa-Missouri line, and the Seals Bros. Mining Co., near Centerville, Iowa, were cited to the Department of Justice on Dec. 6 as willful violators of both the wage provisions of the code and the price schedules established thereunder. Affidavits submitted to the Compliance Board and referred to the Department of Justice charge the Moore company with having openly sold coal to Iowa truckers and teamsters below the minimum prices fixed by the Iowa subdivisional code authority. Likewise, the Seals Bros. company was alleged to have solicited business from Missouri truckers, quoting prices under those established for Missouri.

After another month of controversy over price differentials between Illinois and Indiana, in which freight rate absorptions loomed large, the tangled question was referred to a Washington conference for solution. In the meantime, however, Divi-

Presidential Appointees to Code Authorities

DIVISION I

Divisional, Washington, D. C.: Wayne P. Ellis, Minneapolis, Minn., whose coal associations include: zoning committee, National Fuel Administration; secretary, Logan County (W. Va.) Coal Operators' Association; secretary, Davis Coal & Coke Co.; assistant to the president, Pittsburgh Terminal R.R. & Coal Co.; secretary and manager, Northwestern Coal Dock Operators' Association and the Ellis Coal Bureau; Northwest sales manager, Berwind Fuel Co.

Eastern Subdivision (central Pennsylvania), Lincoln Trust Building, Altoona, Pa.: George J. Anderson, New York, president, Consolidation Coal Co. from 1928 to 1931 and prior to that time member of the executive staff and executive vice-president.

Western Pennsylvania Subdivision, Farmers' Bank Building, Pittsburgh, Pa.: Walter A. Jones, Pittsburgh, oil man, former glass manufacturer and receiver, Wayne Coal Co.

Ohio Subdivision, Rockefeller Building, Cleveland, Ohio: Benedict Crowell, Cleveland, mining engineer, builder and contractor and now chairman of the board, Crowell & Little Construction Co.

Northern West Virginia Subdivision, Fairmont, W. Va.: George B. Hadesty, Pottsville, Pa., ten years a director of the Pemberton Coal & Coke Co. and, over a long period of years prior to 1928, superintendent, division superintendent, general superintendent and general manager, Philadelphia & Reading Coal & Iron Co.

Southern Subdivision No. 1 (low-volatile), Bailey Building, Bluefield, W. Va.: Fred K. Prosser, Bluefield, manager, coal department, Norfolk & Western Ry., and formerly with the Clinchfield Coal Corporation, Virginia, and the Clearfield Bituminous Coal Corporation, Pennsylvania, in engineering capacities.

Southern Subdivision No. 2 (high-volatile), Transportation Building, Cincinnati, Ohio: Frank L. Poindexter, Huntington, W. Va.; formerly with the Chesapeake & Ohio Ry., liquidating manager, Lake & Export Coal Co. and a member of the war-time Pocahontas Regional Coal Committee.

West Kentucky Subdivision, Starks Building, Louisville, Ky.: (no appointment announced).

DIVISION II

Divisional, Chicago: Joseph Harrington, Chicago, designer of stokers and boilers since 1896, formerly administrative engineer for the U. S. Fuel Administration in Illinois and for the last five years a member of the Advisory Board of Engineers, Chicago Department of Smoke Inspection.

Illinois Subdivision, 309 West Jackson Blvd., Chicago: (no appointment announced).

Indiana Subdivision, 400 Opera House Block, Terre Haute, Ind.: Gilbert W. Gambrill, Terre Haute, attorney, member of the firm of Cooper, Hayes, Gambrill & Crawford, and former owner of mining properties.

DIVISION III

Divisional, Webb Crawford Building, Birmingham, Ala.: Herbert S. Salmon, Birmingham, since 1924 a consulting engineer, and prior to that time chief engineer, ore mines and quarries, Tennessee Coal, Iron & R.R. Co., and chief mining engineer, Woodward Iron Co.

DIVISION IV

Divisional, Kansas City, Mo. including Kansas-Missouri-Oklahoma subdivision, Dwight Building, Kansas City, Mo., and Arkansas-Oklahoma smokeless subdivision, Merchants National Bank Building, Fort Smith, Ark.: Robert S. Lemon, Pittsburg, Kan., attorney.

DIVISION V

Divisional, McCornick Building, Salt Lake City, Utah, including northern Colorado subdivision, Denver, Colo., and the Southern Colorado-New Mexico subdivision, Boston Building, Denver: Arthur Vail, member of the staff of the Central Coal & Coke Co. and its predecessors from 1884 until early in 1932, first as an accountant and later as a superintendent.

National Bituminous Coal Industrial Board Personnel

DIVISION I

Wayne P. Ellis, *governmental representative.**

DIVISION I—NORTH

Charles O'Neill, vice-president, Peale, Peacock & Kerr, Inc., New York.
J. D. A. Morrow, president, Pittsburgh Coal Co., Pittsburgh, Pa.

DIVISION I—SOUTH

A. A. Liggett, vice-president, Raleigh Coal & Coke Co., Cincinnati, Ohio.
J. D. Francis, vice-president, Island Creek Coal Co., Huntington, W. Va.

DIVISION II

Joseph Harrington, *governmental representative.**
George W. Reed, vice-president, Peabody Coal Co., Chicago.
Jonas Waffle, managing director, Coal Trade Association of Indiana, Terre Haute, Ind.

DIVISION III

Herbert S. Salmon, *governmental representative.**
H. T. DeBardeleben, president, DeBardeleben Coal Corporation, Birmingham, Ala.

DIVISION IV

Robert S. Lemon, *governmental representative.**
E. M. Douthat, general manager, Majestic Coal Mining Co., Kansas City, Mo.

DIVISION V

Arthur Vail, *governmental representative.**
F. V. H. Collins, president, Bair-Collins Co., Roundup, Mont.

*Governmental representatives are in each case the Presidential appointees to the respective divisional code authorities; three optional Presidential appointees to the industrial board are yet to be named.

sion I had entered into the picture with formal protest against price cutting by Illinois. As a result of the Washington conference, Presidential Code Members Ellis, Gambrill and Harrington on Dec. 7 announced the following conclusions for the guidance of the affected operators:

(1) Fair minimum market prices in the consuming markets as provided in the code must be established. It is our opinion that f.o.b. mine prices should be established.
(2) All freight rate absorptions as such to be discontinued.
(3) Various groups and producing districts here represented agree:
(a) Where approved marketing agencies exist to submit prices to their Code Authority on or before the 22d of each month.
(b) Each Code Authority to submit to the Presidential member all established prices on or before the 25th of each month.
(c) Each marketing agency and Code Authority to proceed at once to establish prices as provided in the code, using as a basis for correlation Franklin County, Illinois, sixth vein coal, bearing in mind comparative quality and marketing experience over a long period of time, such prices to be presented for approval by Dec. 15.
(d) Presidential members will correlate prices between divisions here represented and approve wherever possible, in order that prices may become effective on the first of each month.
(e) In order to take care of the temporary situation until prices may be established and approved as above agreed, prices in effect between Nov. 1 and Nov. 11, in each district with the increase made effective by Indiana effective Dec. 1 be established; no contracts to be made during this period.

The Indiana increase referred to was 10c. on lump and 5c. on egg in territory west of Lake Michigan and the Illinois-Indiana state line, including Lake County, Indiana. The Washington conferences were participated in by representatives from Illinois, Indiana, west Kentucky and the Appalachian fields.

Railroad fuel prices were the subject of a conference between representatives of Division I code authorities and eastern railroads at Philadelphia, Pa., Nov. 23. The carriers requested a special price, which the operators refused after a caucus, on the ground that, among other things, it would weaken the industry's position in respect to requests from public utilities for price reductions. Railroad representatives then announced that their request would be carried to the Presidential appointees to the code authorities, and a conference between a carrier committee and code appointees and operator committees from several divisions was held on Dec. 5. At this meeting, Presidential appointees backed up the stand of the operators and recommended that no change in railroad fuel prices be made at present, pending further consideration of the entire subject.

In preparation for the Jan. 5 conference to determine what, if any, revisions in wages, hours, differentials or other code requirements are necessary, the NRA last month sent out batches of four report forms to the various divisional and subdivisional code authorities. These forms deal primarily with: operating costs for individual mines; company selling costs and overhead; income from coal sales by sizes; and hours and earnings of employees. In addition six engineers were sent out to assist in collecting data, as follows: northern section, Division I, excluding northern West Virginia, Charles Enzian, consulting mining engineer, Pittsburgh, Pa.; southern section, Division I, including northern West Virginia, R. J. Cole, formerly with the Indian Copper Co., Ltd., India; Division II, J. G. Calverly, associate mining engineer, U. S. Bureau of Mines, Pittsburgh; Division III, H. I. Lingle; Division IV, C. L. Young, formerly engineer for the Conveyor Sales Co., New York; Division V, W. Z. Price, formerly with the Buckeye Coal Co., Nemacolin, Pa.

John M. Carmody
Impartial Presidential representative on the divisional labor board for the northern part of Division I; formerly editor of *Coal Age* and *Factory & Industrial Management.*

Bureau of Mines Granted Funds

The U. S. Bureau of Mines has been allotted $200,000 by the Federal Emergency Administration of Public Works for reconditioning work and new construction at the Pittsburgh (Pa.) Experimental Station, and also for reconditioning the experimental mine at Bruceton, Pa. The Bureau also was allotted $16,800 for preparing plans and specifications for an experiment station at College Park, Md.

Presidential, Employer and Employee Appointees to the Divisional Bituminous Coal Labor Boards*

DIVISION I—NORTH

Impartial Presidential Representative—John M. Carmody, Stevenson, Jordan & Harrison, management engineers, New York, and formerly editor of *Coal Age* and *Factory & Industrial Management.*
Employer—R. L. Ireland, Jr., vice-president, Hanna Coal Co., Cleveland, Ohio.
Employee—F. P. Hannaway, Pittsburgh, Pa.

DIVISION I—SOUTH

Impartial—Temporarily vacant, Charles F. Barnes, attorney, Boston, Mass., having refused appointment.
Employer—E. C. Mahan, president, Southern Coal & Coke Co., Knoxville, Tenn.
Employee—Van A. Bittner, president, District 17, United Mine Workers, Charleston, W. Va.

DIVISION II

Impartial—John A. Lapp, Chicago publicist, who has served as director, social action department, National Catholic Welfare Council, and head, Department of Social Science, Marquette University.
Employer—Harvey Cartwright, secretary, Indiana Coal Operators' Association, Terre Haute, Ind.
Employee—Ora E. Gasaway, International executive board member, United Mine Workers, Brazil, Ind.

DIVISION III

Impartial—Judge J. D. Acuff, Jasper, Ala., attorney.
Employer—A. B. Aldridge, vice-president, Stith Coal Co., Birmingham, Ala.
Employee—William Mitch, president, District 20, United Mine Workers, Birmingham.

DIVISION IV

Impartial—M. S. Johnson, Tulsa, Okla., oil producer and mining engineer; president, Oklahoma School of Mines, 1916-1922.
Employer—P. R. Stewart, commissioner, Arkansas-Oklahoma Coal Operators' Association, Fort Smith, Ark.
Employee—David Fowler, president, Provisional District 21, United Mine Workers, Muskogee, Okla.

DIVISION V

Impartial—T. S. Hogan, Denver, Colo., solicitor, Department of the Interior.
Employer—D. D. Muir, Jr., vice-president, United States Fuel Co., Salt Lake City, Utah.
Employee—James Morgan, secretary-treasurer, District 22, United Mine Workers, Cheyenne, Wyo.

*Members of the six divisional boards make up the National Bituminous Coal Labor Board. Only impartial representatives on the divisional boards, however, can participate in decisions of the national board, the other members acting in an advisory capacity.

National Labor Board Ends Anthracite Strike; Holds Elections in Western Pennsylvania

Through the intervention of the National Labor Board, a truce in the struggle between the United Mine Workers and the Anthracite Miners of Pennsylvania for the control of the northern anthracite field was declared on Nov. 13. This brought to an end a long series of insurgent attacks directed at members of the regular union and the properties at which they were employed, culminating in a call for a general strike on Nov. 6, variously estimated to have affected between 25,000 and 35,000 men in District 1. Practically all of the larger operations in Luzerne County were closed as a result of the strike, but mines in Lackawanna County, where the insurgent drive started several months ago, were little affected.

The labor board was brought into the picture as a result of appeals from representatives of the public and the insurgents, and its first action was to dispatch John D. Moore to Wilkes-Barre on Nov. 4 to determine whether intervention was necessary. Mr. Moore ended his investigation on Nov. 7 after hearing representatives of the Anthracite Conciliation Board, the public, the United Mine Workers and the insurgents. Spokesmen for the latter offered a five-point program, acceptance of which they declared would automatically end the strike. These points were: reinstatement of men discharged for insurgent activity; assurance that miners would receive the prescribed minimum day rates, which the insurgents declared had been abolished by the companies; cessation of alleged intimidation by employers; fair consideration of grievances; and recognition of the right of miners to join a union of their own choosing.

Decision to intervene was announced by Senator Robert F. Wagner, chairman of the National Labor Board, on Nov. 9. The board, he said, would establish a fact-finding committee to investigate all complaints dealing with conditions and practices in the field and would "enter upon its duties as soon as picketing is discontinued, and those who have jobs and wish to work at them are permitted to do so without interference." Before agreeing to accept the offer, the insurgents demanded some assurance that men discharged for insurgent activities would be reinstated, which was granted by Senator Wagner on Nov. 10. The end of the strike on Nov. 13, however, was featured by charges of discrimination, which later were repeated at the hearings of the fact-finding committee, which began its investigation on Nov. 20.

Members of the committee are as follows: Charles P. Neill, Washington, D. C., personnel director, Southern Ry.; Elmer F. Andrews, New York, State Labor Commissioner; and Dr. Hugh S. Hanna, editor, *Labor Review*, U. S. Department of Labor, Washington, D. C.

A dispute over the rate for driving chutes, which originated at the No. 6 colliery, Lansford, Pa., resulted in two strikes at the operations of the Lehigh Navigation Coal Co. in the Panther Creek Valley anthracite field. Failure to agree whether the "consideration" rate of 84c. or the "company" rate of 74c. should be paid resulted in a strike at five collieries on Nov. 13. This came to an end on Nov. 15, but was renewed on Nov. 17 at seven operations. The last stoppage terminated on Nov. 20, the general mine committee voting to request the National Labor Board to investigate the grievances of the miners.

The holding of elections at steel-company mines in western Pennsylvania to determine employee representatives was the chief feature of bituminous labor developments in November. The balloting followed a resumption of work at captive operations on Nov. 6, growing out of President Roosevelt's assurance that the check-off, one of the major points of controversy, had been conceded by the companies, and that a formal agreement at least as favorable as the Appalachian agreement would be made between the operators and elected representatives (November *Coal Age*, pp. 387-88).

The elections covered 32 operations of the following companies: Allegheny Coal & Coke Co.; Consumers Mining Co.; Crucible Fuel Co.; H. C. Frick Coke Co.; Inland Collieries Co.; National Mining Co.; Pickands, Mather & Co.; Republic Steel Corporation; Shannopin Coal Co.; Sharon Coal & Limestone Co.; Vesta Coal Co.; and the Weirton Steel Co. The ballots included two tickets representing the United Mine Workers and the various independent brotherhoods, and contained spaces for writing in choices not appearing. Tentative results by mines, as released by the National Labor Board, which conducted the elections on Nov. 23-24, are shown in the accompanying table.

Results at the seventeen mines of the Frick Co., which showed independents in the lead at ten operations and close votes at three others, were reported to be a painful surprise to the United Mine Workers. Philip Murray, vice-president, submitted affidavits to the National Labor Board on Nov. 29 alleging that the company had resorted to coercion, intimidation and bribery at the polls, and requested that the board consider action on the charges. At the same time, Mr. Murray declared that as representatives of the United Mine Workers received nearly 4,000 votes at Frick mines, while the highest number cast for any independent was 536, the United Mine Workers was entitled to represent all the miners. On Nov. 29, the National Labor Board announced the election of United Mine Workers and independents in accordance with the vote shown in the accompanying table, except at the Edenborn mine, where a new election has been ordered.

While Governor Horner moved to settle the warfare between the United Mine Workers and the Progressive Miners of America by laying the dispute before the National Labor Board on Nov. 16 with a request that it assume jurisdiction, the Progressives went to the federal court at Peoria, Nov. 13, in an attempt to force employment of its members at the mines of seven companies now employing regular union miners. Action was delayed on the injunction requested by the insurgents pending a decision on whether or not the court had jurisdiction.

Attempts by union sympathizers to prevent non-union miners from working at the Jewel Ridge (Va.) mine of the Jewell Ridge Coal Corporation resulted in the dispatch of twenty state police to the region on Nov. 20 and 21 to keep order. A peaceful settlement was negotiated a few days later. Employees at the three mines of the Kemmerer Gem Coal Co., St. Charles, Va., returned to work early in November after a two weeks' strike over dismissals and deductions for lamp rentals and union dues. No action was taken on the latter two points.

Through the efforts of John D. Moore, representing the National Labor Board, the Gallup (N. M.) strike initiated by the National Miners' Union in August was brought to an end on Nov. 23, both sides agreeing to the terms arrived at with the help of the labor board's representative. Withdrawal of troops and the release of a considerable number of strike sympathizers from jail was expected to follow immediately.

Tentative Results of Captive Mine Elections in Western Pennsylvania

(The two columns under each heading represent the range of votes on each "ticket"—that is, the total for the leader and the lowest. Results are exclusive of contested votes.)

	United Mine Workers	Independents	Scattering
Allegheny Coal & Coke Co.:			
Allegheny	91– 89	.....	44
Consumers Mining Co.:			
Harmarville	479-473	28- 20	..
Crucible Fuel Co.:			
Crucible	591–587	10– 9	..
H. C. Frick Coke Co.:			
Colonial No. 1	548–546	285–284	..
Colonial No. 3	363–361	469–466	..
Colonial No. 4	395–393	399–397	..
Edenborn	290–288	288–286	2
Filbert and Ralph	514–512	405–403	..
Footedale and Buffington	500–497	536–531	2
Gates and Palmer	252–249	182–181	1
Kyle	24– 24	159–159	..
Leckrone No. 1	45– 45	114–114	..
Leckrone No. 5	56– 55	63– 63	..
Leckrone strip plant	15– 15	113–109	9
Maxwell	420–419	112–111	..
Ronco	170–168	338–337	..
Trotter	8– 8	231–229	2
Inland Collieries Co.:			
Indianola	183–181	.....	6
National Mining Co.:			
National No. 1	217–215	33– 32	..
National No. 2	593–583	58– 52	..
Pickands, Mather & Co.:			
Mather Collieries	761–751	.....	11
Republic Steel Corporation:			
Russelton	325–321	44– 43	33
Shannopin Coal Co.:			
Shannopin No. 2	305–304	42– 41	20
Sharon Coal & Limestone Co.:			
Leesburg No. 2	222–221	41– 37	..
Leesburg No. 5	172–170	75– 70	..
Vesta Coal Co.:			
Vesta No. 4	580–569	.....	16
Vesta No. 4*	322–318	.....	11
Vesta No. 5	541–534	.....	4
Vesta No. 6	354–349	.....	2
Weirton Steel Co.:			
Isabella	593–587	20– 19	..
Total	9,929–	4,045–	163

*Additional polling place.

At Dawson, N. M., approximately 300 miners ended a strike against the Phelps Dodge Corporation that tied up the company's operation on Oct. 2. While the men failed to secure a union contract, one of the principal reasons for the strike, the company granted the right to a checkweighman and a basic wage rate of $4.70. The previous rate was $4.48, it was reported.

Utah operators entered into a wage agreement with the United Mine Workers for the first time in history on Nov. 20. The agreement, which is retroactive to Nov. 1, continues the basic inside and outside day rates of $5.44 and $4.48, respectively, as well as the other rates which previously prevailed, with the exception of the rates for machine runners, increased from $5.76 to $6.40, and helpers, raised from $5.52 to $6. No change was made in the loading rates, which range from 40c. per ton for loading only, including tracklaying and timbering, to 65c. for pick-mining in coal over 5 ft. and 69c. for coal under 5 ft.

Personal Notes

F. F. DIXON, formerly general superintendant, Price Hill Colliery Co., Price Hill, W. Va., has been made general manager of the company's operations, succeeding S. Dixon, who, however, retains the presidency.

B. M. CLARK, Indiana, Pa., was elected chairman of the board of the Rochester & Pittsburgh Coal Co. in November. He is succeeded as president by HEATH S. CLARK, formerly vice-president, whose headquarters will be in New York City.

B. R. GEBHART, director of public relations, Illinois Coal Bureau, has been appointed managing director of the Illinois Subdivisional Code Authority, with headquarters in Chicago.

J. E. LEE, who joined the organization in 1920 and later was made treasurer, was appointed general manager of the Sheridan-Wyoming Coal Co., Kleenburn, Wyo., in November. W. A. GALLAGHER, purchasing agent, was named assistant general manager.

CHARLES F. HOSFORD, JR., Butler, Pa., has retired as president of the Butler Consolidated Coal Co. RALPH E. SPRANKLE, secretary-treasurer, has taken over Mr. Hosford's duties.

JOHN L. KEMMERER, New York, was elected chairman of the board of the Kemmerer Coal Co., Frontier, Wyo., in November. T. J. O'BRIEN, vice-president in charge of sales, Salt Lake City, succeeds Mr. Kemmerer as president. L. M. PRATT, secretary, was elected vice-president.

J. S. MILLER, director of research, Lehigh Navigation Coal Co., has been appointed Alliance district superintendent, with headquarters at Kaska, Pa., succeeding the late D. K. Glover.

L. G. BALL, president, Heisley Coal Co., and J. F. MACKLIN, president, Monroe Coal Mining Co., have been elected vice-presidents in charge of sales and production, respectively, for J. H. Weaver & Co., Philadelphia, Pa.

Permissible Plates Issued

Six approvals of permissible equipment were issued by the U. S. Bureau of Mines in August, September and October, as follows:

(1) Northwestern Improvement Co.; shaker conveyor; 20-hp. motor, 440 volts a.c.; Approval 257A; Aug. 11.

(2) Northwestern Improvement Co., Type G mining machine; 50-hp. motor, 250 volts, d.c.; Approval 258; Aug. 11.

(3) Northwestern Improvement Co., Type G mining machine with drill; 50-hp. motor, 440 volts a.c.; Approval 259A; Aug. 16.

(4) Northwestern Improvement Co., Type J mining machine with drill; 50-hp. motor, 440 volts, a.c.; Approval 260A; Aug. 17.

(5) Sullivan Machinery Co.; Type CLE-5 longwall mining machine; 50-hp. motor, 220-440 volts, a.c.; Approvals 261 and 261A; Sept. 12.

(6) Economy Electric Lantern Co., Inc.; Model 42-BM "Ecolite" electric lantern; Approval 1012; Oct. 17.

HUGH MORROW, president, Sloss-Sheffield Steel & Iron Co., Birmingham, Ala., was elected vice-president of the Alabama Employers' Association at the organiaztion meeting held at Gadsden, Nov. 27. The association was formed to secure equalization of freight rates between intrastate points.

EDWARD MORGAN, mining engineer, Union Pacific Coal Co., Winton, Wyo., has been transferred to the Superior mine, succeeding MELVIN SHARP, now fuel inspector for the Union Pacific R.R. at Rock Springs, Wyo.

Obituary

WILLIAM H. DAVIS, 55, superintendent, Cambridge Collieries Co., Cambridge, Ohio, died at Columbus, Ohio, last month, after a heart attack.

EDWARD A. EVANS, an inspector for the Ohio Division of Mines and Mining for twelve years, died at his home in New Philadelphia, Ohio, Nov. 18.

DONALD K. GLOVER, general superintendent, Alliance division, Lehigh Navigation Coal Co., died suddenly of acute indigestion while on duty at the Kaska William colliery, Kaska, Pa., Nov. 10.

WILLIAM C. STRATTON, 52, general manager, United States Coal & Coke Co., died suddenly of a heart attack at Gary, W. Va., Nov. 12. Mr. Stratton joined the organization in 1921 as chief engineer, and was made general superintendent in January.

THOMAS JEFFERSON ROBSON, 51, vice-president and general manager, Wyatt Coal Co., died at Charleston, W. Va., Nov. 19, after a week's illness. Before joining the Wyatt organization, Mr. Robson was connected with the C.&O. Ry.

To Settle 200 Miners' Families On West Virginia Farm

As a demonstration project in the subsistence homestead program of the federal government, the Subsistence Homestead Division of the U. S. Department of the Interior has acquired a 1,100-acre farm near Reedsville, Preston County, W. Va., and will settle on it 200 families of unemployed coal miners from within a radius of 20 miles of the farm. Settlers will combine subsistence farming with industrial employment, and the project is designed to demonstrate the feasibility of decentralization of industry. In line with this objective and in the absence of private industry near the project, plans call for the construction of a factory for the production of special supplies for the Postoffice Department to give each family an income of about $1,000 per year. Handicrafts industries also will be developed.

Homes will be modest yet comfortable affairs costing about $2,000 each and will become the property of the settlers under 20-year purchase contracts providing for small monthly payments, low interest charges and a small down payment. Each home will be located on 2 to 4 acres of land suitable for gardening, fruit trees, poultry raising and the production of other foodstuffs for home consumption. The project will be financed out of a fund of $25,000,000 set aside by Congress in the public works section of the NIRA, and similar projects are being worked out with private industry in other parts of the country to take care of 10,000 to 12,000 families left stranded by shifts in industry.

Extend Date of Scrip Clause

By an executive order issued Nov. 27, President Roosevelt has extended the effective date of the company scrip clause of the master retail code (November *Coal Age*, p. 385) from March 1 to July 1, 1934. The Industrial Stores Association, Cincinnati, Ohio, has organized an emergency executive committee, with Paul R. Umberger, general manager, Koppers Stores, Inc., Pittsburgh, Pa., as chairman, to organize the campaign against the clause.

Associations

F. V. H. Collins, president, Bair-Collins Co., Roundup, Mont., was elected president of the new Rocky Mountain-Pacific Coal Association, organized during the course of Division V code authority meeting in Denver, Colo., early in November. Headquarters of the association are in Salt Lake City, Utah. L. T. Dee, vice-president, Lion Coal Corporation, Ogden, Utah, and Gilbert C. Davis, manager, Stag Canon Branch, Phelps Dodge Corporation, Dawson, N. M., were chosen vice-presidents, and John R. Doolin, Salt Lake City, secretary-treasurer.

John A. Templeton, president, Linton-Summit Coal Co., Terre Haute, Ind., was reelected president of the Indiana Coal Operators' Association at the annual meeting held on Nov. 21. H. M.

Ferguson, president, Clinton Coal Co., Clinton, Ind., was chosen vice-president, and Harvey Cartwright, Terre Haute, was reelected secretary-treasurer and commissioner.

T. C. Russell, general superintendent, coal department, Anaconda Copper Mining Co., Butte, Mont., was elected president of the Montana Coal Operators' Association last month, vice F. W. C. Whyte, general manager of the Anaconda fuel operations, resigned.

All officers of the Harlan County Coal Operators' Association were reelected at the annual meeting at Harlan, Ky., on Nov. 15, as follows: president, S. J. Dickenson, general manager, Mary Helen Coal Corporation, Coalgood, Ky.; vice-president, B. W. Whitfield, president, Harlan Collieries Co., Harlan, Ky.; secretary, George S. Ward, Harlan; traffic manager, Roy Carson, Louisville, Ky.; safety director, J. F. Bryson, Harlan.

W. M. Zeller, Jr., president, Knox Consolidated Coal Co., Indianapolis, was elected president of the Coal Trade Association of Indiana at the annual meeting held early in December. David Ingle, president, Ingle Coal Co., Evansville, was elected vice-president, and Jonas Waffle, Terre Haute, was gain chosen managing director.

NCA Moves for Gas Tax

With the backing of the National Coal Association, which initiated the program, a movement directed toward the passage of federal legislation imposing a substantial tax on natural-gas production got under way in November. The association began preparation of a brief on the subject for distribution to all coal men for their use in presenting the issues to their Congressmen or Senators, and announced that the United Mine Workers and the Anthracite Institute would lend their support and also join in a joint appeal to the President.

Industrial Notes

VULCAN IRON WORKS, Wilkes-Barre, Pa., announces that all sales activities have been concentrated under the direction of FRED O. SMITH, vice-president.

W. W. GILLETT, formerly with Gellatly & Co., Pittsburgh, Pa., in charge of underground mechanical equipment, has joined the staff of the WILMOT ENGINEERING Co., Hazleton, Pa., in a similar capacity.

THE KELPO free-wheeling, or one-way industrial, clutch has been acquired by the Morse Chain Co., Ithaca, N. Y., a division of the Borg-Warner Corporation, from the Kelpo Clutch Co., Rockford, Ill., and will be manufactured at Ithaca and sold by Morse representatives. FRED M. POTGIETER, president, Kelpo company, has joined the Morse organization.

DANVILLE IRON & STEEL Co., Danville, Pa., maker of large stone crushers and pulverizers, has been merged with the KENNEDY-VAN SAUN MFG. & ENGINEERING CORPORATION, New York.

LOUIS ALLIS Co., Milwaukee, Wis., has appointed the following to its sales organization: New Mexico, C. F. CATE, Albuquerque; Connecticut, ROBERT B. SODERBERG, Hartford; New York City, N. O. LAWYER, with headquarters at the New York office; Cincinnati, Ohio, G. W. CONNER, Chamber of Commerce Building.

Hearings Held on Wholesale, Retail and Dock Codes

Retailers, wholesalers and dock operators all had their day before the NRA in November. With Deputy Administrator William H. Davis presiding, hearings on the retail solid-fuel code were held on Nov. 13. Wholesalers presented their code on Nov. 15, and dock operators appeared on Nov. 16.

One of the major problems growing out of the various hearings and subsequent negotiations was a wide difference of opinion as to just what constitutes "retailing" and "wholesaling." In the revised draft of the retail code, set for hearing Dec. 15, the National Retail Coal Merchants' Association defined the former function as "the selling and delivering of solid fuel in other than railroad cars or cargo vessels," subject, however, to determination in disputed cases by joint conference between representatives of the retailers and related (i. e., wholesale, dock and producing) industries. Both the wholesalers and western retailers had protested against unqualified definitions which might lead to dispute as to whether a particular order should come under the retail or wholesale code or would force one branch of the industry under the jurisdiction of the code of a related branch. A similar provision for determining whether certain business should be considered as retail or dock trade also was incorporated in revisions suggested for the dock trade. Wholesalers were reported to be in sympathy with such qualifications.

Another outgrowth of the deliberations on the retail code was the elimination, according to the NRA, of Secs. 28, 29 and 30 of Art. VI, which were the subject of protests by the Anthracite Institute, Alabama Mining Institute and the National Coal Association. These sections made it a violation of the code for a dealer to fail to require solid fuel to be reweighed at the point of discharge from car to barge en route to the purchaser or to require that the seller bill for both the commodity and the freight charges at the weight so determined, or to fail to require the shipper to make a just and reasonable water allowance when the fuel is loaded by water which passes into the car or where the washed solid fuel is loaded while wet.

To Seal Abandoned Mines

A total of $1,519,750 for sealing approximately 21,400 abandoned mine openings to protect public water supplies in Pennsylvania, West Virginia, Ohio, Indiana, Illinois, Tennessee, Maryland, Kentucky, Virginia and Alabama was allotted by the federal Civil Works Administration in November. Work will begin immediately under the technical supervision of the U. S. Public Health Service and will employ 6,506 miners, 49 engineers and 17 clerks. The program is based on several years of field work in sealing openings by the Pennsylvania and West Virginia Departments of Health and the U. S. Bureau of Mines, which has shown, it is reported, that sealing is both practicable and relatively cheap.

Coal-Mine Fatalities

Coal-mine accidents caused the deaths of 63 bituminous and 29 anthracite miners in October, according to information furnished the U. S. Bureau of Mines by state mine inspectors. This compares with 84 bituminous and 20 anthracite fatalities in September. Based on a production of 29,656,000 tons, the bituminous death rate in October was 2.12 per million tons, against 2.85 in September, when the output was 29,500,000 tons. The anthracite death rate rose from 4.01 in September, when 4,993,000 tons was mined, to 6.16 in October, based on an output of 4,711,000 tons. For the two industries combined, the October death rate was 2.68, against 3.02 in September.

Comparative fatality rates for the first ten months of 1933 and 1932, by causes, are given in the following table:

FATALITIES AND DEATH RATES AT UNITED STATES COAL MINES, BY CAUSES*

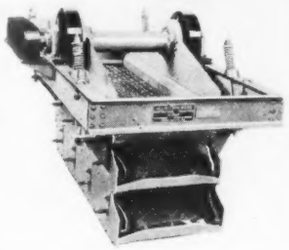
Cause	Bituminous: Number Killed	Bituminous: Killed per Million Tons	Anthracite: Number Killed	Anthracite: Killed per Million Tons	Total: Number Killed	Total: Killed per Million Tons
January-October, 1932						
Falls of roof and coal	380	1.558	118	2.951	498	1.754
Haulage	109	.447	24	.600	133	.469
Gas or dust explosions:						
Local explosions	8	.033	7	.175	15	.053
Major explosions	54	.221	...	.....	54	.190
Explosives	16	.066	9	.225	25	.088
Electricity	36	.147	5	.125	41	.145
Machinery	17	.070	1	.025	18	.063
Surface and miscellaneous	63	.258	22	.550	85	.299
Total	683	2.800	186	4.651	869	3.061
January-October, 1933						
Falls of roof and coal	375	1.401	97	2.415	472	1.533
Haulage	131	.489	25	.623	156	.506
Gas or dust explosions:						
Local explosions	17	.063	10	.249	27	.088
Major explosions	7	.026	...	....	7	.023
Explosives	14	.052	9	.224	23	.075
Electricity	42	.157	6	.149	48	.156
Machinery	12	.045	2	.050	14	.045
Surface and miscellaneous	53	.198	31	.772	84	.273
Total	651	2.431	180	4.482	831	2.699

*All figures are preliminary and subject to revision.

WHAT'S NEW
IN COAL-MINING EQUIPMENT

Vibrating Screens; Steel Sheaves

Allis-Chalmers Mfg. Co., Milwaukee, Wis., offers two new vibrating screens for sizing all commercial materials, either wet or dry. Style "B" centrifugal screens are built with one, two or three decks in sizes from 2x6 to 5x14 ft., and, according to



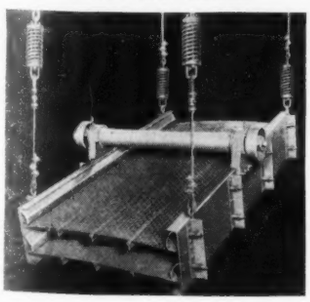
Style "B" Centrifugal Screen

the company, are designed to handle heavy loads and a maximum range of material size. Screening is accomplished by a rapid, mechanically produced eccentric motion, the intensity of which does not vary with the rate of feed. The screen body floats on balance springs, thus reducing power and bearing load, it is asserted.

The "Aero-Vibe" screen is suspended from the supporting structure by cables and springs, and thus "floats in the air," the company says. A rapid, adjustable vibrating motion is imparted by counterweighted wheels mounted on the drive shaft attached to the screen body. "Aero-Vibe" screens are available in single- and double-deck models in sizes from 1½x3 to 4x8 ft. for handling medium to fine materials and for limited tonnages.

Allis-Chalmers also announces that Texrope drives with either one or two Texsteel sheaves are now available in ratings from ¼ to 15 hp. for many industrial applications. Texsteel sheaves, the company says, are of grid-type construction with accurately formed heavy-gage steel sections electrically welded at the web and rim. Outer rims are rolled for protection and strength. Integral bushings or solid bored hubs are standard, and the sheaves are said to be well-balanced, light and practically indestructible.

"Aero-Vibe" Screen

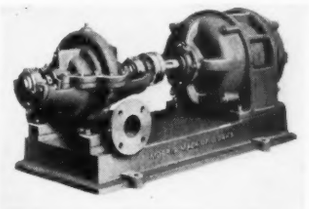


Fuel Calculation

Fuel Engineering Co. of New York, N. Y., offers the "Fuel Valuegraph" for the rapid calculation of relative fuel values and the cost of steam. Each "Valuegraph" consists of a one-page chart, and by use of the various basic scales printed thereon it is possible to compare the relative values of two coals, make comparisons of fuel values on a unit basis, calculate the effect of a change in efficiency, make comparisons of steam cost, calculate the increase in efficiency necessary to offset higher fuel cost and compare fuel oil with coal.

Double-Suction Pumps

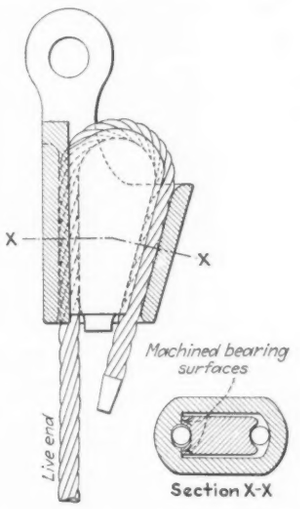
Morris Machine Works, Baldwinsville, N. Y., has announced a new line of double-suction, split-case centrifugal pumps specially developed for direct connection to electric motors or steam turbines operating at 3,500 r.p.m. Also, it is pointed out, they may be belt- or gear-driven by low-speed prime movers.



While following the principles of standard centrifugal pump design, the company cites the following provisions to meet the special problems of high-speed operation: individual testing of impellers, shafts and couplings for rotative balance, followed by a test of the entire rotating unit; impellers designed and finished to minimize friction and eddy losses; deep-groove, heavy-duty precision ball bearings on each side to handle both radial and thrust loads; special proportioning of bearing supports, bedplates, casings and shafts to provide complete rigidity. The new pumps are built in sizes from 1½ to 5 in.

Wedge Socket

John A. Roebling's Sons Co., Trenton, N. J., offers the "No Pinch" wedge socket, which it declares will develop in excess of 90 per cent of the ultimate rope strength. This socket is designed, according to the company, to prevent damage to ropes through excessive pressure on the pulling rope at the upper end of the socket basket, and this is accomplished by providing both the wedge and socket with machined bearing surfaces. Then, as the rope tension increases and the wedge is pulled into the socket, the bearing surfaces transfer the additional pressure, or pinch, to the dead side, which carries less load.



Extension of the bearing surfaces above the top of the socket basket and the unsymmetrical form of the wedge prevent tilting of the latter and insure proper alignment, thus distributing pressure on the live end of the rope uniformly and keeping it down to allowable limits, according to the company. "No Pinch" wedge sockets are available in sizes from ⅜ to 2⅜ in.

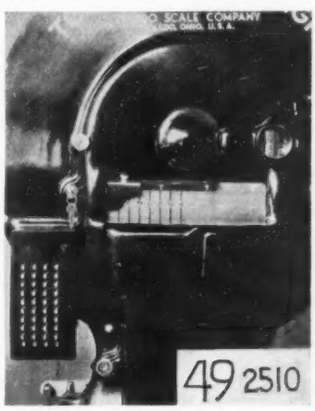
Weight Recorder

For printing weight figures and miners' check numbers or other identification numbers on a strip-paper record, which may either be ejected through a slot or wound up inside, Toledo Scale Co., Toledo, Ohio, offers the weight-recording device shown in the accompanying illustration for use on its coal-mine dial scales. The illustration also shows the printed record for one car of coal, the weight to the nearest 100 lb. (smaller divisions are available, if desired) appearing at the left and the miner's check number at the right.

Check numbers are set up on the selective numbering keyboard illustrated. In case checks are fastened inside the car or are not immediately available for other reasons, the weights alone may be recorded and the checks accumulated on a spindle in the order in which the cars are weighed. Where this procedure is followed, the check numbers may be printed on the strip record in the order of weighing and later matched with the weights.

The strip record carrying the printed weights and identification numbers may be removed from the device at any time to permit transfer of the informa-

Toledo Weight-Recording Device and Printed Record Showing Weight and Check Number



tion to the daily tally sheet for posting and to the company books as necessary. The device, according to the company, is available in combinations sufficiently flexible to handle almost any requirement.

Screening Aids

Abbe Engineering Co., New York, calls attention to the use of flat reinforcing bars as a means of prolonging the life and efficiency of wedge-wire sieves. Through the use of these flat bar reinforcements, which may vary widely in accordance with the type of screen used, material handled and carrying capacity, loosening of the profile wires through the action of the machine, with consequent enlargement of the slots, is prevented, it is said. Rima wedge wire is fitted with new patent spacing lugs which in themselves usually are sufficient to prevent enlargement of the slots, the company declares.

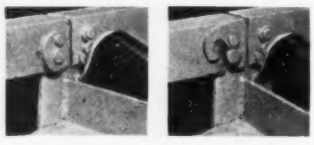
Stressing the need for an absolutely firm connection between the sieve and edge support and carriers, Abbe Engineering Co. also offers a number of new edges for use with Rima wedge wire. Included in the list are the following: "K" edge, made with automatic riveting of the crossbars; "L" edge, primarily for the joining of several sieves; "D" edge, primarily for stationary sieves; "S" edge, primarily for shaking or vibrating sieves; and "B" edge, which is equipped with crossbars protruding the desired length to accommodate the carriers and supports offered by the various manufacturers.

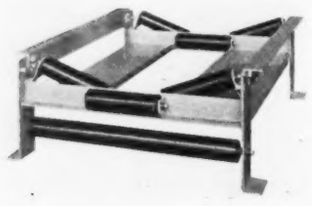
Mine Conveyor

Robins Conveying Belt Co., 15 Park Row, New York City, offers a new mine conveyor which it declares is designed for extremely low headroom. Simple, strong construction is stressed. The carrying strand of the belt is supported on three-pulley anti-friction troughing idlers, while the return strand is carried on anti-friction rollers. Both troughing idlers and return rolls are mounted in structural-steel cradles to which the longitudinal tie angles are attached by means of hook connections which allow freedom of movement vertically to compensate for changes of floor level, but which have great rigidity in the lateral plane.

Each piece of the standardized sectional steel frame, according to the company, is reversible and interchangeable, and can be assembled easily and quickly without tools by unskilled labor. There are no loose parts, such as pins and bolts, to get lost. The self-contained drives are reversible, so that new sections for extending the length of the conveyor may be sent in on the belt. A sliding take-up section 8 ft. long is provided at the tail end to allow extension up to this distance without setting in additional frame sections. The type of belt lacing used is said to allow quick and easy insertion of additional belt sections.

Bottom, Standard Section, Robins Mine Conveyor; Top, Joint Between Conveyor Sections With Hook Open and Closed

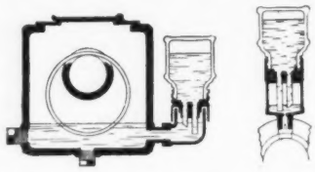




Oilers

SpeedWay Mfg. Co., Cicero, Ill., offers the new "Constant Level" oilers for use on bottom- or side-opening ring-oiled bearings, waste-packed bearings and ball or roller bearings where the oil should be maintained at a definite level in the reservoir. Automatic operation is claimed, a drop in the oil level uncovering the bottom of the short tube and permitting air to enter the oil chamber of the oiler, whereupon just the correct quantity of oil flows out of the long tube to replenish that used in the bearing.

The company also offers the "Thermal" oiler for use on open-type sleeve bearings. These oilers, the company says, are operated by a change in the temperature of the bearing. Heat in the bearing causes the air in the thermal chamber to expand, thus forcing oil into the bearing until the temperature drops. The supply is replenished from the oil chamber through the long tube.



Left, "Constant Level" Oiler; Right, "Thermal" Oiler

Metallic-Lead Lubricant

Armite Laboratories, Los Angeles, Calif., offer "Bestolife," a new lubricant in which metallic lead broken down into such fine particles as to be virtually liquid within the vehicle is the protective element. It is said to form a thin protective film of lead on all contact surfaces, changing them to continuous, unbroken, anti-friction areas. With a lead content of from 10 to 65 per cent, the lubricant is said to be free from chemical reactions and to withstand temperatures up to 430 deg. F.; it will not lose its lubricating qualities until the melting point of lead, 590 deg., is reached. In coal mining, the company recommends its use for lubricating wire lines, car wheels, pump and valve packing, gears, bearings, pipe threads, sheaves and guides.

Contents, Coal Age for December, 1933

With which is consolidated "The Colliery Engineer" and "Mines and Minerals"

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EDITORIAL STAFF: Sydney A. Hale, Editor; R. Dawson Hall, Engineering Editor; Ivan A. Given, J. H. Edwards, L. C. McCarthy, Paul Wooton; A. F. Brosky, Consulting Editor. Sales Manager, A. W. Fisher.

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New 600 ton-per-hour preparation plant of Midland Electric Coal Corporation at Middle Grove, Ill.

99

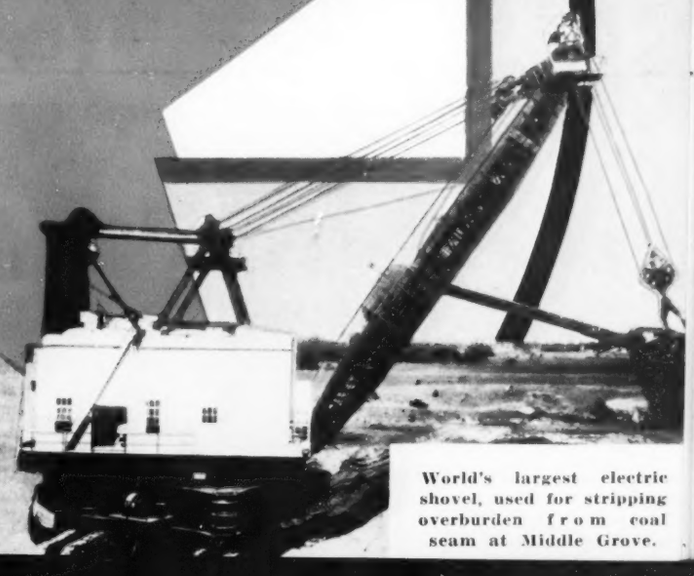
Midland Electric

assures efficient performance from *all equipment*

at its new Middle Grove Mine with

TEXACO

REG. T.M.

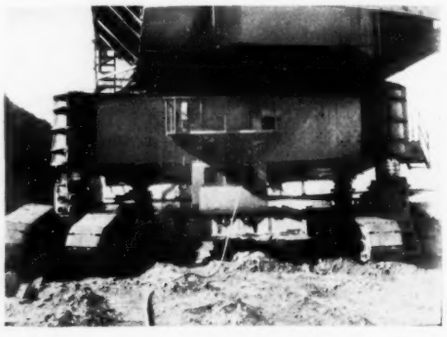


World's largest electric shovel, used for stripping overburden from coal seam at Middle Grove.

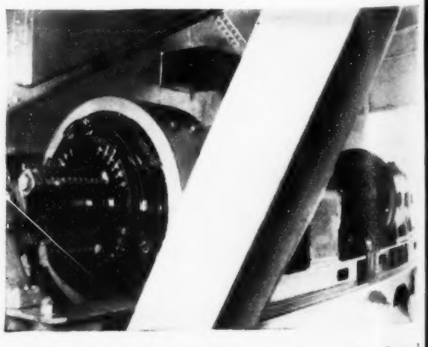
How TEXACO

20 cu. yd. ELECTRIC SHOVEL *at* *"Midland Electric"* LARGEST IN THE WORLD *Lubricated throughout by* TEXACO OILS *and* GREASES

5-cu. yd. electric power shovel used for loading coal into standard gauge cars. Boom sticks on both shovels are lubricated with TEXACO Graphite Axle Grease. Open spur gears with TEXACO Crater Compound.



Rear view of 20-yd. stripping shovel. TEXACO Black Oil is used for the hydraulic jacks and for the oil bath on caterpillars. Same on 5-yd. shovel.



500 hp. motor generator set on 20-yd. shovel. TEXACO Alcaid Oil is used on the ring-oiled bearings.

planned lubrication

cuts power and maintenance costs for.....

"MIDLAND ELECTRIC"

Starting "fresh" with a large investment in the finest machinery for their purpose that money can buy, Midland Electric has realized the importance of proper lubrication and has taken adequate measures to keep power and maintenance costs down to the lowest possible figure.

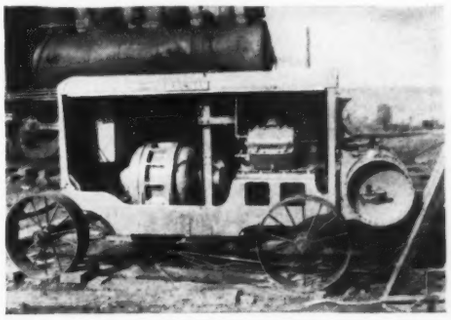
Before a wheel turned, TEXACO Lubrication Engineers were called in for consultation, and a definite program for effective lubrication was laid out which provides the right TEXACO oil or grease for every bearing or wearing surface on the property, from the giant 20-ton electric power shovel to the loading booms at the tipple. Nothing has been left to guesswork for TEXACO engineers have specified not only *which* lubricant should be used on each bearing but *how much.* Thus, the yearly cost of this TEXACO-planned lubrication is known in advance and is surprisingly low — although *low operating costs* rather than *low lubricating costs* were the fundamental consideration.

By presenting illustrations of outstanding items of equipment at "Midland Electric" together with data regarding particular TEXACO lubricants used in each case, we have endeavored to give definite examples of the way in which TEXACO Planned Lubrication is helping to cut power and maintenance costs.

There is a TEXACO LUBRICANT for every Type of mine on every class of equipment

Standard-gauge steam locomotive for hauling coal from stripping to preparation plant. TEXACO Leader Valve Oil is used in the steam cylinders, TEXACO Rod Grease on the piston rods, and TEXACO Aleph Oil on the bearings.

Caterpillar Tractor used with scraper for cleaning up after the stripping shovel. TEXACO Valor Oil is used in the crank case, TEXACO No. 569 Gear Oil in the transmission case. In summer TEXACO No. 922 is used for grease gun fittings, in winter TEXACO Star Grease No. 00.



Portable air compressor. TEXACO Alcaid Oil used for ring-oiled bearings also for compressor cylinders.

TEXACO *engineers... are ready to help you cut your operating costs*

Whether your plant is new, like that of the Midland Electric Coal Corporation, or has been in service for many years, TEXACO Engineers are ready to help you make sure that you are getting the best possible lubrication at the lowest possible cost.

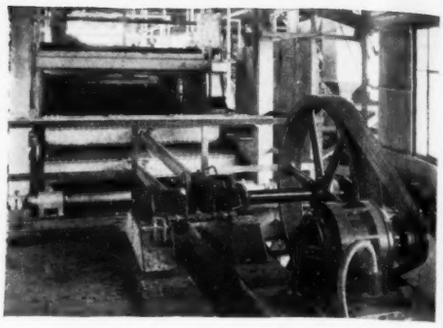
TEXACO Lubrication Surveys are thorough and complete —carried out by highly trained lubrication engineers who have a wide background of successful experience in coal mining service. These engineers, working in cooperation with your own, will select the correct grade of oil or grease for every part of every machine and show your employees how to use it without waste.

At most mines a TEXACO Lubrication Survey will show how to cut the actual cost for lubricants, and in practically every case it will show how power costs can be reduced, and the useful life of valuable equipment prolonged.

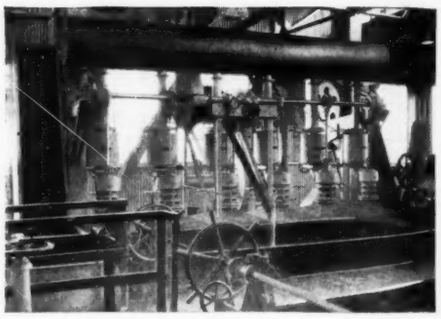
Now, more than ever before, profits must come out of savings in power and maintenance costs. Write today for a TEXACO Lubrication Survey (no charge or obligation) and get the benefit of lower power and maintenance costs throughout 1934.

THE TEXAS COMPANY

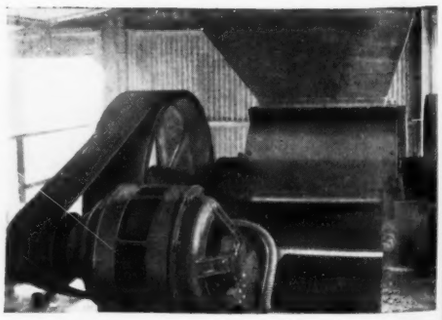
135 East 42nd St., New York, N. Y.



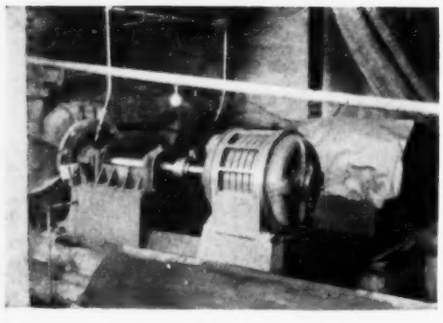
Shaking Screen. TEXACO Star Grease No. 00 used in Farvel centralized lubricating system on this and other equipment.



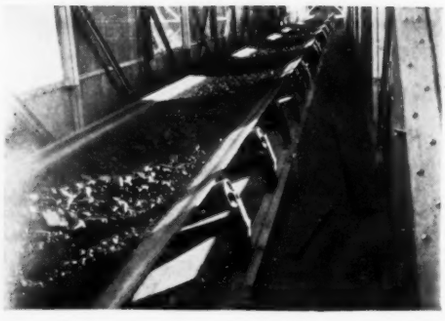
Simmon-Carves Washer. TEXACO Canopus Oil used on centrifugal compressor in summer, TEXACO Capella Oil in winter.



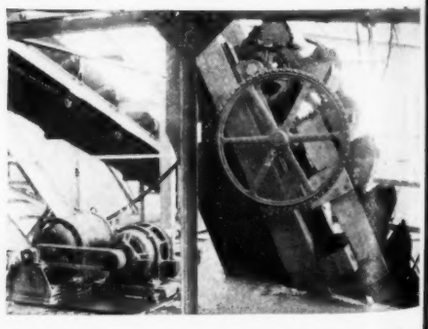
Crusher, TEXACO Crater Compound used on gears, TEXACO Cup Grease No. 1 on bearings.



Centrifugal pump for Preparation Plant water circulation. TEXACO Alcaid Oil used on ring-oiled motor bearings. TEXACO Star Grease No. 6 on pump bearings.



Main belt conveyor from surface to head of tipple. TEXACO Star Grease No. 00 used on grease-gun fittings of idlers.



Bucket Elevator and Speed-Reducer drive. TEXACO Black Oil used on elevator chain. TEXACO Conopus Oil used on spur-gear speed reducer in summer; TEXACO Capella Oil in winter.

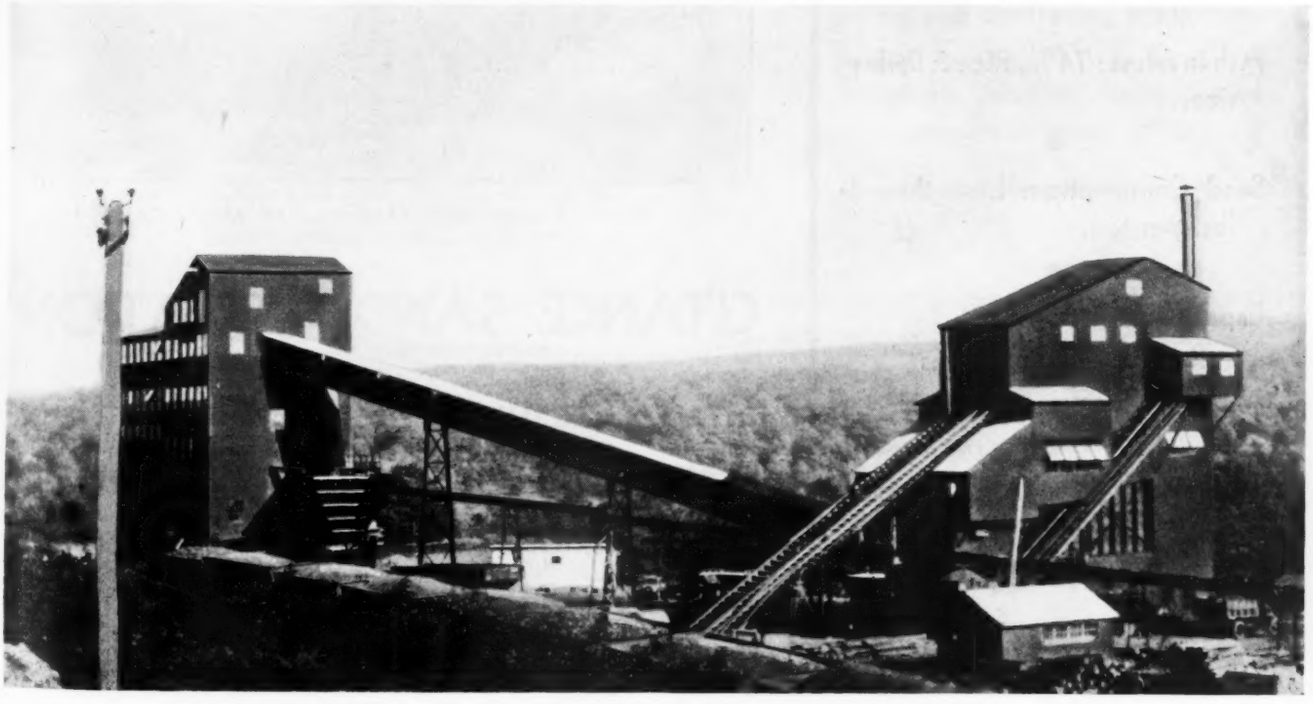
Again KOPPERS-RHEO CLEANING is selected for Simplicity, Effectiveness and Low Costs . . . . . .

STARTING fresh — with no restrictions on their choice of methods or equipment—the experienced mining executives, responsible for the new Indian Head Anthracite Colliery, considered very carefully the relative merits of every accepted coal cleaning process. Their selection of the Koppers-Rheo system follows the present trend throughout the entire coal industry and adds one more to the list of Koppers-Rheo installations in the anthracite fields.

These Indian Head executives realized that Koppers - Rheo cleaning and preparation assures uniformity of product, highest recovery for any required quality of product, and lowest operating costs.

It is significant that the entire preparation plant was designed (in cooperation with the Indian Head engineers) and constructed by The Koppers Construction Co. By thus bringing all preparation elements into a unified design and construction under a single responsibility, the total cost was surprisingly moderate.

Whether you are starting "fresh" or are facing the problem of modernizing an existing plant, Koppers engineers will be glad to make constructive suggestions without charge and with no obligation whatever on your part.



KOPPERS-RHEOLAVEUR COMPANY

KOPPERS BUILDING

Sales Office
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Chicago, Ill.

The Rhéolaveur CURRENT-WASHER

REG. U. S. PAT. OFFICE

PITTSBURGH, PA.

Sales Office
357 Warren Avenue,
Kingston, Pa.

The New GOWEN BREAKER of the BUCK MOUNTAIN COAL MINING CO.

cleans all sizes of Anthracite,

Egg to Buckwheat No. 4 inclusive, by the

CHANCE PROCESS OF SAND FLOTATION

RESULTS:

Increase in car yield: 4%

•

Increase in prepared sizes: 12%

•

Ash in coal: 8½ to 11%, all sizes

•

Ash in refuse: 74%, Rice & Barley sizes.

•

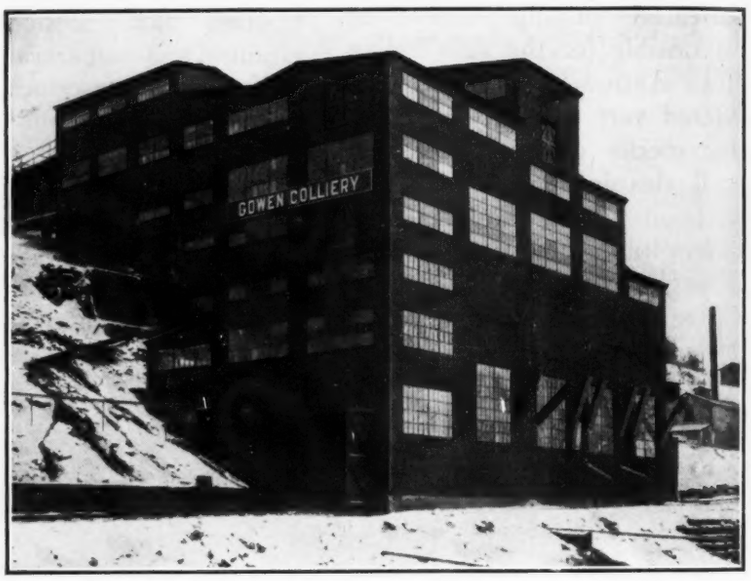
Sand Consumption: Less than 4 lbs. per ton.

•

Capacity per 8-hour shift:
Raw Coal:—1600 tons
Clean Coal:—1050 tons

•

Twelve men dump all mine cars, load all railroad cars, and operate and maintain entire plant.



Gowen Breaker, Buck Mountain Coal Mining Co.
Fern Glen, Luzerne County, Penna.

CHANCE SAND FLOTATION

always assures the utmost in low first cost, economical operation, minimum breakage, complete recovery and perfect cleaning.

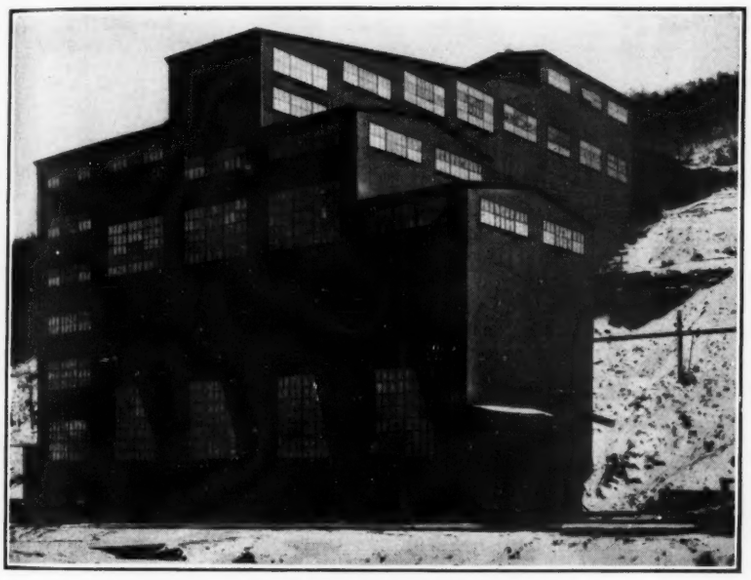
The CHANCE COAL CLEANER

MEARS BUILDING SCRANTON, PENNA.

The **GOWEN BREAKER** was designed, built and placed in operation by

STAPLES-SWEENEY MANUFACTURING CO.

in 108 days, for a lump sum of $120,000 including everything between mine tracks and railroad tracks.



Gowen Breaker, Buck Mountain Coal Mining Co.
Fern Glen, Luzerne County, Penna.

DATA:

Foundations: 250 cu. yds. Concrete

•

Frame: 233 tons Structural Steel

•

Covering: Asbestos protected metal and steel sash.

•

Equipment: Steam operated mine car dump, five sets of crusher rolls, two Chance Cleaners, shaking screens, movable loading boom, etc.

•

Electrical Installation: 335 Horsepower of motors, starting, switching and distributing equipment.

•

Complete heating, lighting and greasing systems.

Other Installations of this kind that have been completed by us:

Judge Washery, Jessup, Pa.
One 15 ft. cone.

Clifford Coal Company, Avoca, Pa.
One 15 ft. cone.

Randolph Colliery, Port Carbon, Pa.
Complete Breaker.

Enterprise Colliery, Excelsior, Pa.
Complete Breaker.

Marvine No. 2 Colliery, Scranton, Pa.
Four 15 ft. cones.

Langcliffe Colliery, Avoca, Pa.
One 15 ft. cone.

Stevens Coal Company, Shamokin, Pa.
Complete Breaker.

Powderly Colliery, Carbondale, Pa.
Four 7'6" cones.

Harry E. Colliery, Luzerne, Pa.
One 15 ft. cone and two 8 ft. cones.

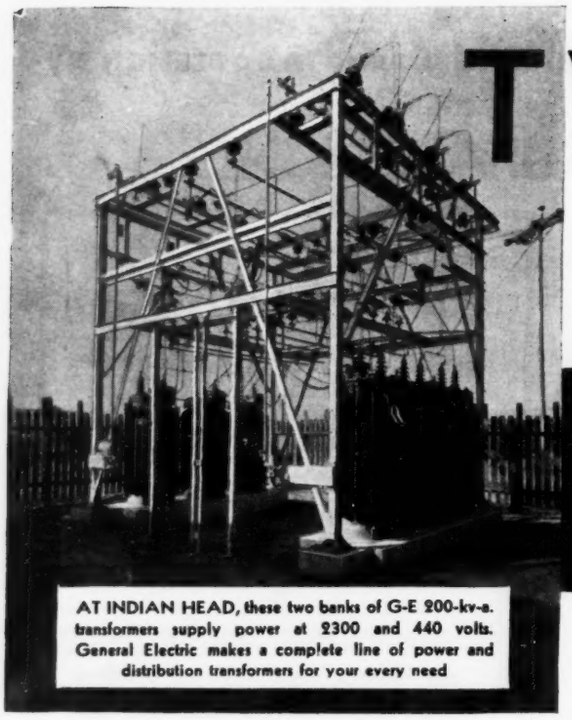
Oak Hill Colliery, Minersville, Pa.
One 8 ft. cone.

STAPLES-SWEENEY

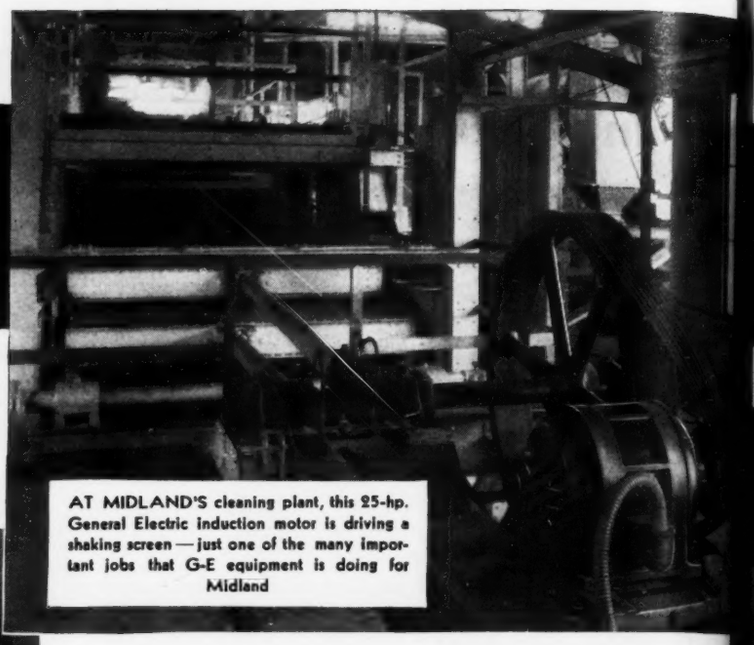
MANUFACTURING COMPANY

MEARS BUILDING SCRANTON, PENNA.

TWO NEW

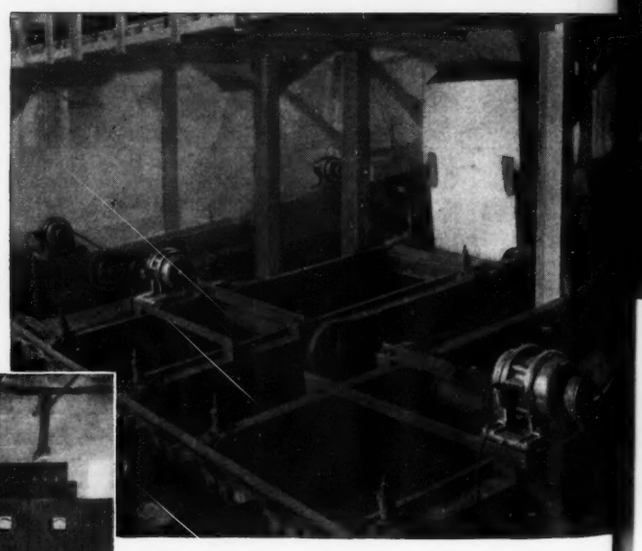


AT INDIAN HEAD, these two banks of G-E 200-kv-a. transformers supply power at 2300 and 440 volts. General Electric makes a complete line of power and distribution transformers for your every need

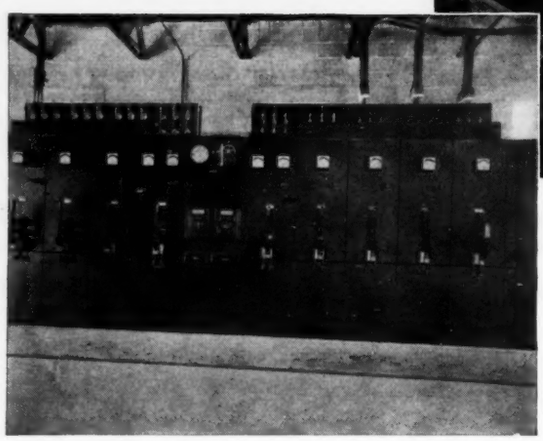


AT MIDLAND'S cleaning plant, this 25-hp. General Electric induction motor is driving a shaking screen — just one of the many important jobs that G-E equipment is doing for Midland

AT INDIAN HEAD, a G-E 100-hp. induction motor drives the main hoist on Slope No. 1. This is just one of more than 600 successful hoist installations that General Electric has made in the United States alone



AT MIDLAND, this battery of vibrating screens in the cleaning plant is operated by G-E motors and control. From shaking screen to mine hoist, General Electric has the RIGHT MOTOR and the RIGHT CONTROL for every job

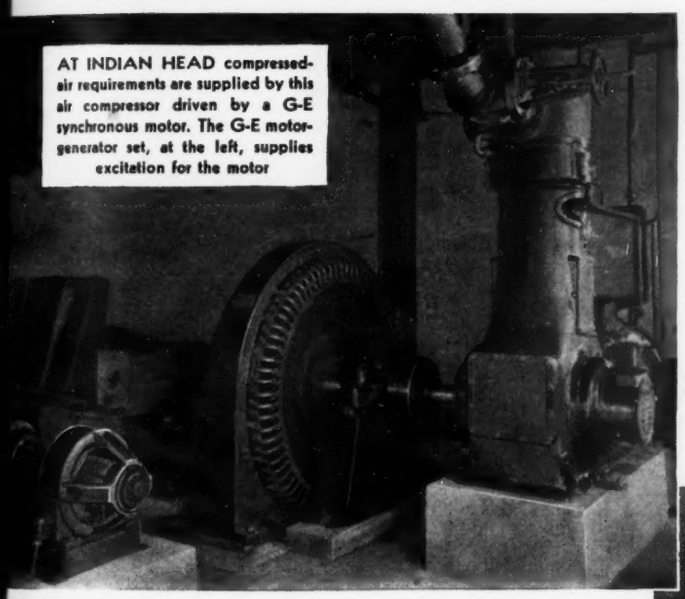


AT INDIAN HEAD, this G-E switchboard, with G-E oil circuit breakers protecting the feeder and distribution circuits, handles power for many operations. Here, again, dependability is of primary importance

G E N E R A L

MINES EQUIP *for* PROFITS

You, Too, Can Reduce Costs with Modern Electric Equipment



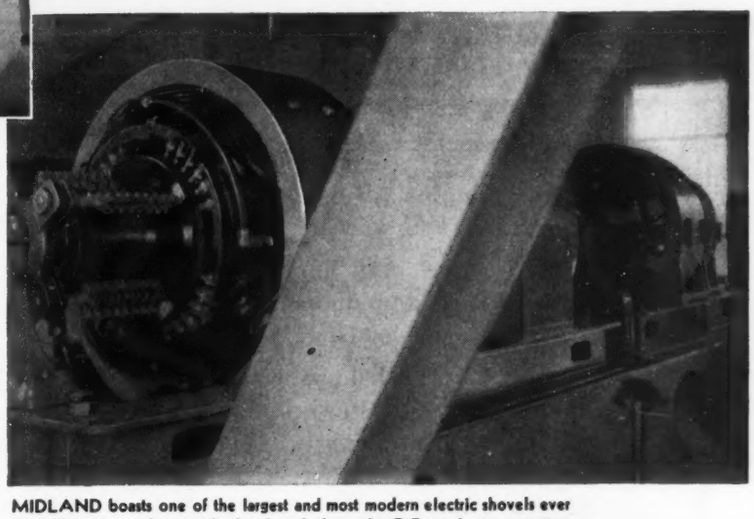
AT INDIAN HEAD compressed-air requirements are supplied by this air compressor driven by a G-E synchronous motor. The G-E motor-generator set, at the left, supplies excitation for the motor

THE Indian Head Colliery, Tremont, Pa., and the Midland Electric Coal Corporation's strip operation at Farmington, Ill., two new mines, have made a wise beginning by choosing dependable electric equipment which will give them long, trouble-free service — equipment that is designed and engineered especially for the job. That's why they have selected General Electric equipment for so many of their important jobs.

Why not equip *your* mine with the RIGHT MOTOR and the RIGHT CONTROL and other G-E equipment for the modern mine, so that you may be in a stronger competitive position?

CONSULT General Electric first! From it, you can buy all the electric equipment you need for the modern coal mine, from one manufacturer.

General Electric can meet every need with dependable equipment, progressive engineering, and prompt, competent service. Not the least of these is service—matched renewal parts readily available for the emergency; conveniently located service shops, warehouses, and sales offices, always ready to help you to obtain the most economical solution of your problems of electric equipment for the coal mine. General Electric, Schenectady, N. Y.



MIDLAND boasts one of the largest and most modern electric shovels ever built. This view, taken inside the shovel, shows the G-E synchronous-motor-generator set which supplies power to the operating and traction motors. G-E control is used exclusively

NRA WE DO OUR PART

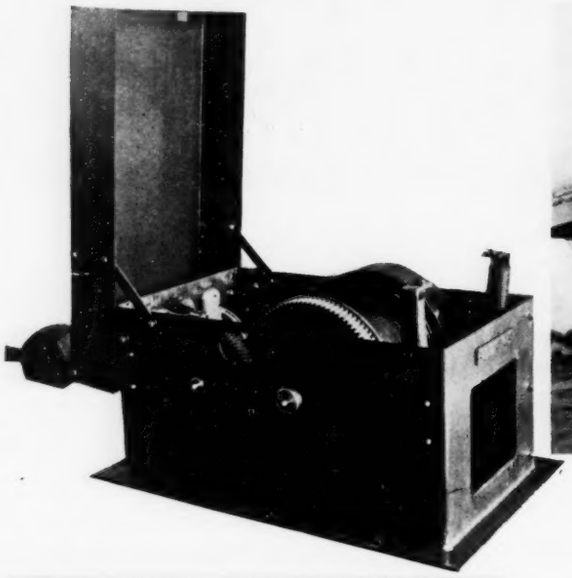
200-794

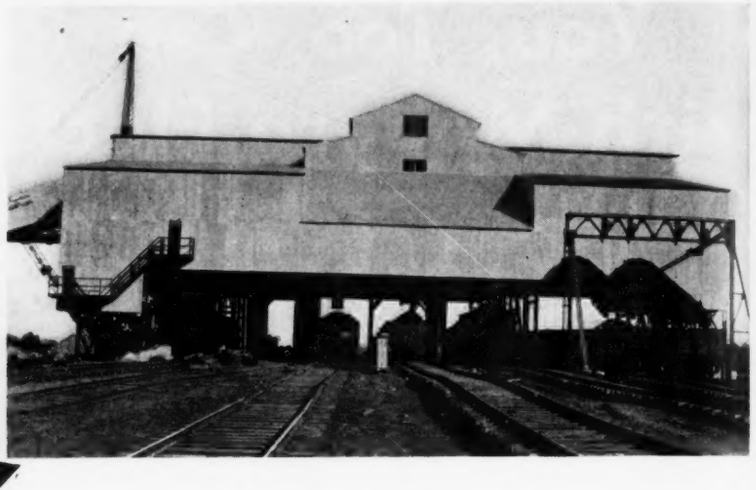
E L E C T R I C

RECOGNITION

again given HOLMES

because of PRODUCT QUALITY





SEVEN HOLMES CAR RETARDERS

are in service on the tracks under the tipple for ECONOMICALLY HANDLING THE CARS—

It was a very logical move on the part of the Midland Electric Coal Corporation to standardize on Holmes Car Retarders. Today low-cost performance is given most careful thought and this new mining operation at Farmington, Ill., took no chances in economy when they selected these self contained, compact, entirely enclosed, and modern car retarders. Full protection is assured to operators and machines. The separate rewind control is a feature of great value. Easy to install. Built in both standard and heavy duty types.

Holmes Self-Dumping All Steel Mine Cages of design and strength for every need.

Holmes Sheaves stand up under faster hoisting and heavier loads.

Holmes Mine Hoist Drums can be specially designed to successfully meet any hoisting problem.

Holmes Lowering Spirals slide the coal instead of dropping it.

Holmes Loading Booms and Picking Tables.

Holmes Coal Feeders for Shaker Screens and Conveyors.

Holmes Gravity Operated Weigh Hoppers.

The dependable and economical service being given by the many Holmes mining products for numerous mining properties is selling Holmes products today. We design and build complete tipples, and tipple and other coal mining equipment. Consultation is invited. Write us for catalog.

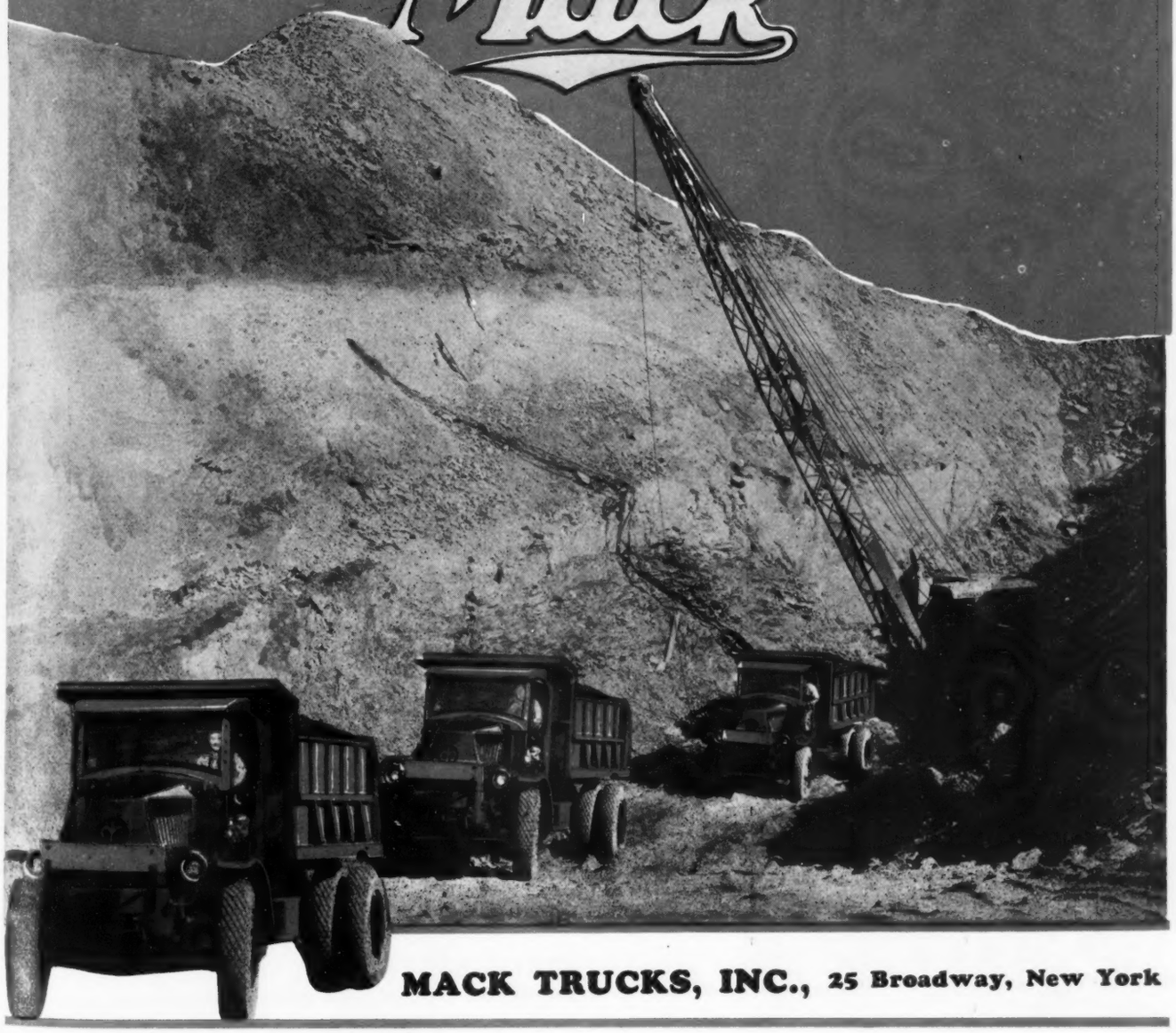
ROBERT HOLMES & BROS., INC.
DANVILLE, ILLINOIS

Eastern Office:—A. W. Berghoefer, 122 E. 42nd St., N. Y.
Western Office:—J. Q. Lalor, 726 S. Ogden St., Denver
Chicago:—H. J. Burckart, 53 W. Jackson Blvd.

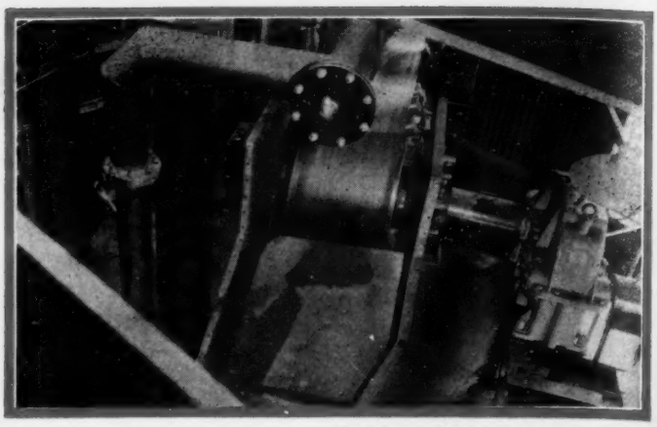
At Indian Head . . .

Macks keep pace with other modern equipment in this model anthracite mine. Stripping represents a large part of present output. Coal is loaded directly into Macks and quickly hauled out of steep inclines. Mack Trucks can *take it* under tough going like this. Put Macks to work, then compare their cost and dependability with any other equipment for stripping transport service. You, too, will be convinced of Mack supremacy where economy and performance count.

Mack



MACK TRUCKS, INC., 25 Broadway, New York

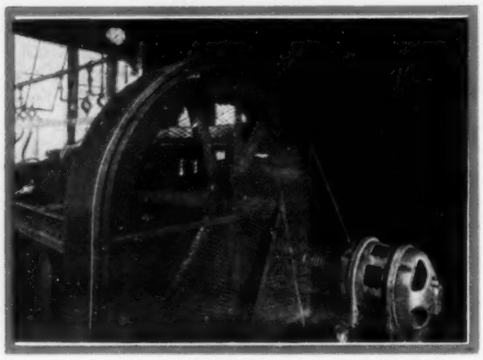


The drive end of the belt conveyor leading from head-house to washery. The pulleys and idlers shown in this picture are Sprout-Waldron.

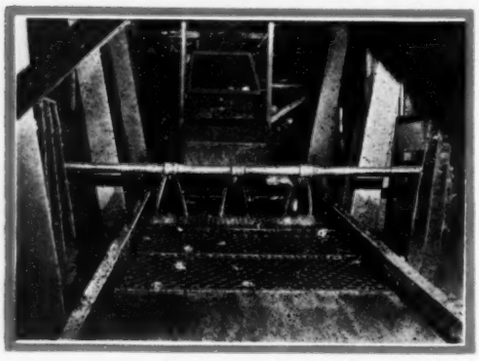
the story of "Indian Head" is a story of SPROUT-WALDRON

Shakers - Feeders - Conveyors
Picking Tables - Screens - Drives

Sprout-Waldron roller bearing idlers equipped with Alemite fittings are installed on the conveyor belt.



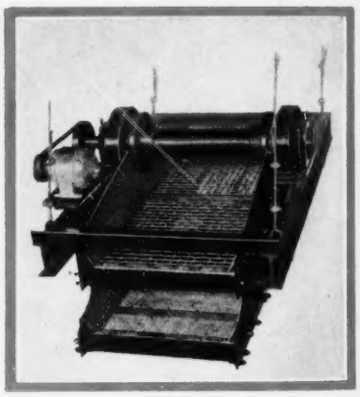
The Bull Shaker in the head-house which was furnished by Sprout-Waldron.



The upper coarse coal shaker, triple deck.

Here at Indian Head Anthracite you will find an operating illustration of the unusual manufacturing and engineering facilities of Sprout-Waldron. You will find belt conveyor idlers, bucket elevators, power transmission appliances, vibrating screens completely designed and manufactured by Sprout-Waldron.

You will see shaker screens, screen drives and sheet metal shapes of all kinds, manufactured by Sprout-Waldron to the specifications of Koppers Rheolaveur.



The bone vibrating screen, built and supplied by Sprout-Waldron.

Possessed as it is of four complete and competent manufacturing departments, Sprout-Waldron & Company is particularly well adapted to furnish standard as well as special equipment to the coal mining industry. Two foundries for both gray and white iron, complete machine shop, adequate sheet metal fabricating facilities plus a superior wood working department give Sprout-Waldron & Company an unsurpassed range of manufacturing. In addition Sprout-Waldron has an experienced engineering department and of course does all its own pattern work.

You should acquaint yourself at once, not only with our standard equipment but with our facilities for doing special work as well. An inquiry will bring complete information quickly and without any obligation on your part.

What are your handling or conveying problems? Our experience in the coal mining industry is at your disposal in the design and construction of the equipment you need.

Send for printed matter showing what we have done in the production of MONARCH Handling Equipment on a large scale all thru American Industry—it will convince you of our ability to meet your requirements.

SPROUT-WALDRON & CO., INC.
Engineers • Founders • Machinists
MUNCY, PA.

Another *Amazing Achievement* in Automatic Coal Washing!

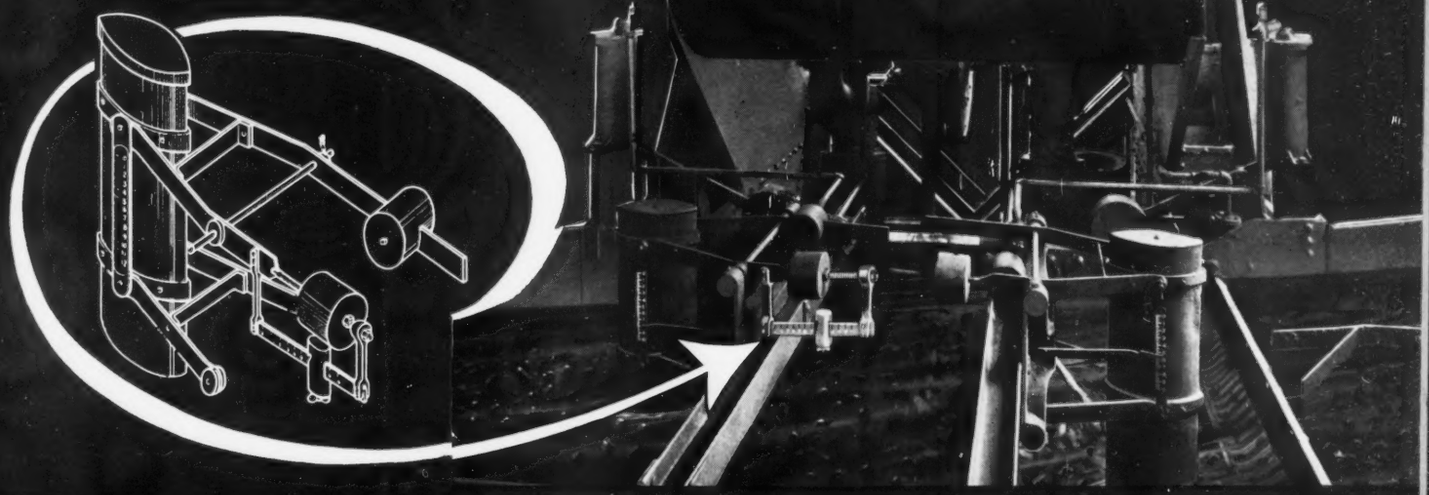
The New McNally-Pittsburg Automatic Rejection Control that accurately governs ash in washer output

The NORTON Automatic Washer—already a phenomenal success for the separation of refuse from coal—now rises to a higher achievement in adjustable ash control.

The new McNally-Pittsburg Adjustable "Counterpoise"—a sensitive governor which controls the opening of the Norton refuse gates—permits the tipple operator to load washed fuel of any predetermined ash content. This is accomplished by simply moving a sliding weight on a graduated balance beam.

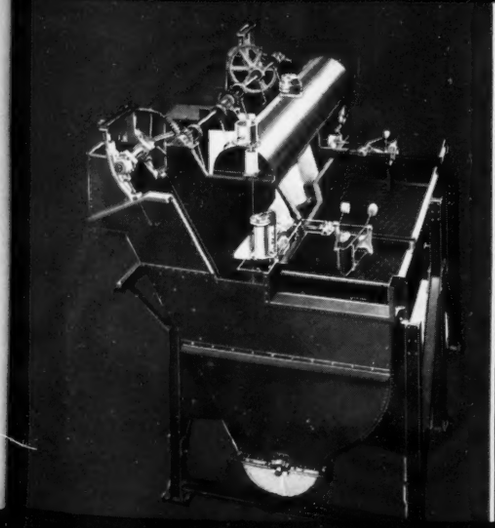
The Counterpoise can be instantly set to change the gravimatric separating point and thereby change the ash content of the clean coal. A precise, automatic production of premium coal of any required ash content can be guaranteed to your customers.

Mines using the Norton Washer report no increase in overall operating cost after installing this efficient washer, but they do show a greater profit through the sale of washed fuel at a premium price. Meet the competition of other fuels in your area with "Norton Washed" Coal. Mail the post card for the Norton Data Book.



McNally-Pittsburg

DESIGNERS—MANUFACTURERS—ERECTORS OF COMPLETE COAL TIPPLES



MAIL THE POSTCARD for data on Norton Automatic Washer

Please mail Bulletins on:

- ☐ Norton Automatic Washer
- ☐ Pittsburg Adjustable Double Roll Breaker

Name .....

Company .....

Address .....

(This reply card requires no postage)

THE McNally-Pittsburg MFG. CORP.

DESIGNERS—MANUFACTURERS— ERECTORS OF COMPLETE COAL TIPPLES

Over 2,000,000 Tons of Washer Capacity

that's the 20-month Sales Record for the Norton Automatic System

In less than two years, Norton Automatic plants have been contracted for or installed in the face of keen competition. Is that last evidence of the superiority of the Norton System over the style manually-controlled washers.

McNally-Pittsburg engineers will gladly submit, without obligation, answers to any questions regarding economies of costs and expected results of the Norton Coal Washer in your mine. These figures are backed by actual results over a period of years in England and America.

Coal Mines Using the Norton Washer

Montevallo Coal Co.
Birmingham, Ala.

Linton Summit Coal Co.
Terre Haute, Ind.

Mead Smokeless Coal Co.
Beckley, W. Va.

Universal Coal Washing Co.*
Pinckneyville, Ill.

Connellsville Fuel Co.
Rhodes, Ky.

Pittsburg & Midway Coal Mining Co. (2 units)
Pittsburg, Kan.

Windsor Coal Co.
Windsor, Mo.

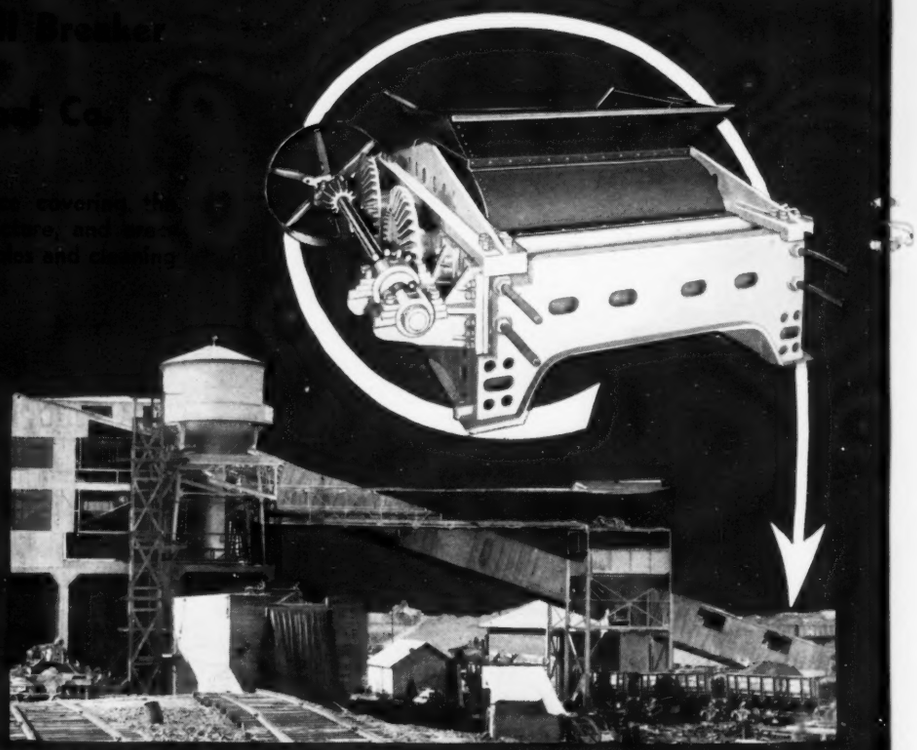
* Under Construction

McNally-Pittsburg Double Roll Breaker in the new tipple of the Midland Electric Coal Co. Farmington, Illinois

The new tipple of the Midland Electric Coal Company at Farmington, Illinois, is equipped with a McNally-Pittsburg Double Roll Breaker.

The McNally-Pittsburg line also includes screens, elevators, conveyors, crushers, picking tables, loading booms, automatic washers, rotary car dumpers and other equipment necessary for complete tipples and cleaning plants.

The McNally-Pittsburg organization offers coal operators a



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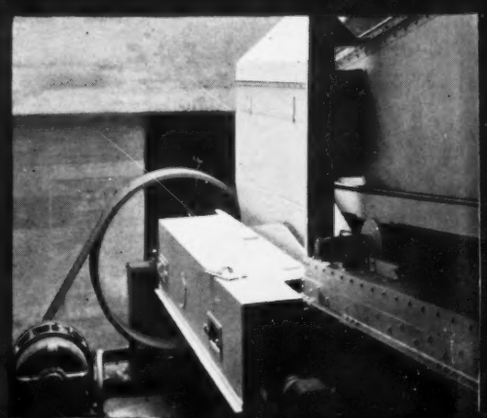
BUSINESS REPLY CARD
First Class Permit No. 12795, Sec. 510, P. L. & R., Chicago, Ill.

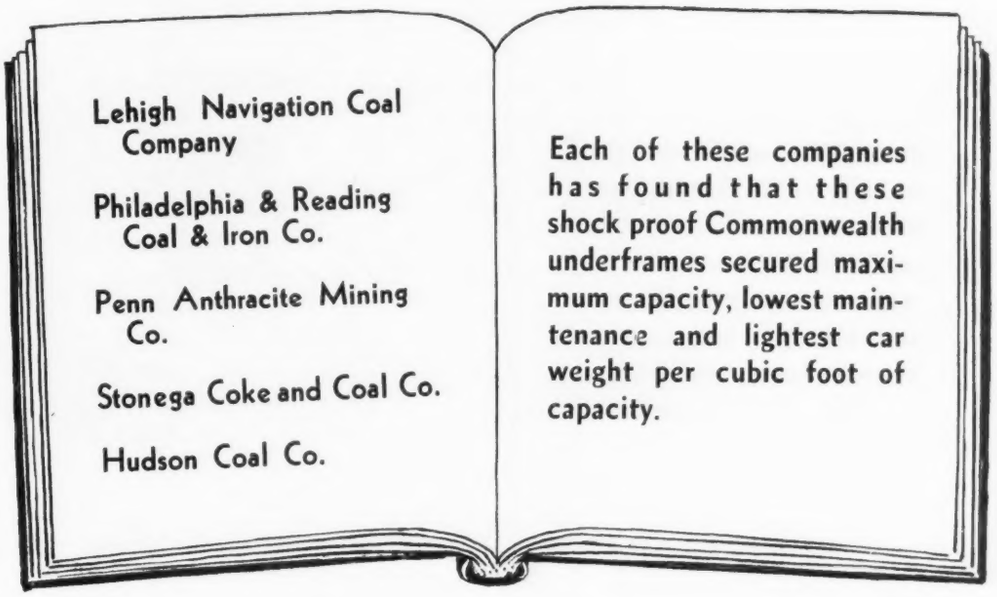
THE McNally-Pittsburg MFG. CORP.

205 W. Wacker Drive

CHICAGO, ILL.



LET'S LOOK AT THE RECORD


Lehigh Navigation Coal Company
Philadelphia & Reading Coal & Iron Co.
Penn Anthracite Mining Co.
Stonega Coke and Coal Co.
Hudson Coal Co.
Each of these companies has found that these shock proof Commonwealth underframes secured maximum capacity, lowest maintenance and lightest car weight per cubic foot of capacity.

SINCE 1930

Five of the largest and most efficiently operated coal mining properties in America have purchased mine cars with Commonwealth One-piece Cast Steel Underframe.

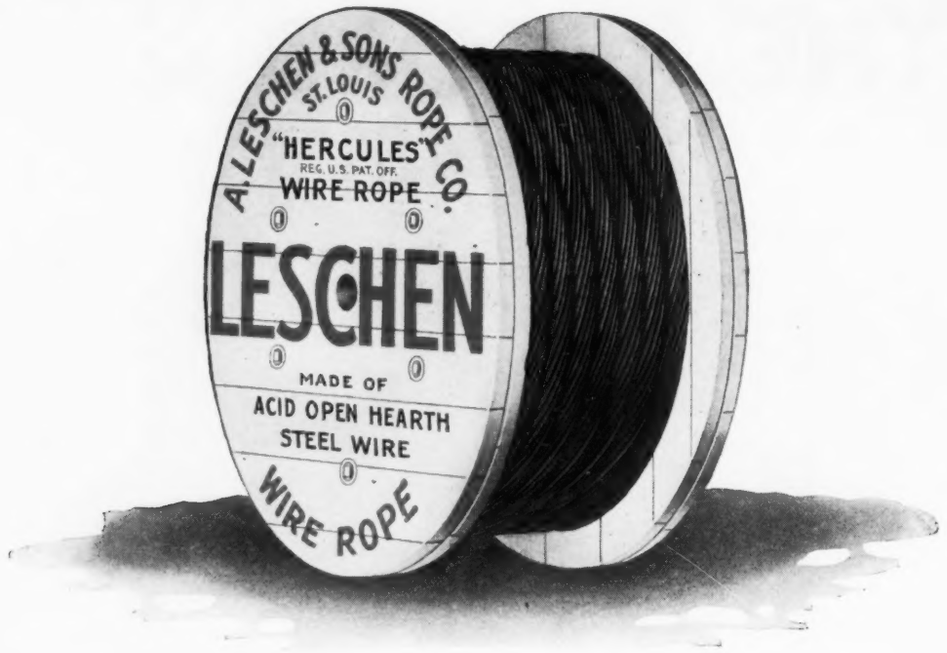
Displacing as they do hundreds of parts, bolts and rivets, they prevent loose bottoms, the most common source of maintenance expense. Built far stronger than other mine car frames, they provide maximum insurance against collision damage. Made of a special acid resisting steel, they are practically impervious to acid mine waters.

Although the first cost is higher, it is quickly returned in operating and maintenance savings. Commonwealth underframes are a well-paying investment.

With wages pegged and the price of coal fixed, modernization of haulage systems now offer (on most properties) one of the greatest opportunities for more profitable operation. Let us show you the savings we can make on your property.

GENERAL STEEL CASTINGS CORPORATION

Eddystone, Pa. | COMMONWEALTH PRODUCTS | *Granite City, Ill.*



How Can Old Operating Costs Be Maintained Since Wages Are Increased?

This is a question to which many of us are now seeking an answer.

It seems to be the opinion of some that the way to bring this about is to buy material that is low in first cost, but do you agree with them? After all, are not final results what actually count?

We do not claim that "HERCULES" (Red-Strand) Wire Rope is the lowest first cost rope that can be bought, but we are firm in our contention that it is the most economical heavy duty wire rope that can be used. It will not only do more work for each dollar of its cost, but on account of its longer life, less time will be spent in making replacements; moreover, it can be depended upon, even when extra hard conditions are encountered.

There are reasons, of course, why "HERCULES" is so dependable and long lasting, and we would be glad to have anyone interested in saving money on this item of their equipment write to us for further particulars.

NRA MEMBER U.S. WE DO OUR PART

The Wire Rope with the Service Record

Made Only by **A. LESCHEN & SONS ROPE CO.** Established 1857

5909 KENNERLY AVENUE · ST. LOUIS, MO.

New York - - - - - - 90 West Street
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WHEAT

NEW Model "W"

MORE LIGHT

LESS WEIGHT

FEWER AND STRONGER PARTS

LESS WORK IN LAMP ROOM

SUBSTANTIALLY LOWER PRICES

APPROVED AUG. 1933 BY BUREAU OF MINES

ELECTRIC CAP LAMP

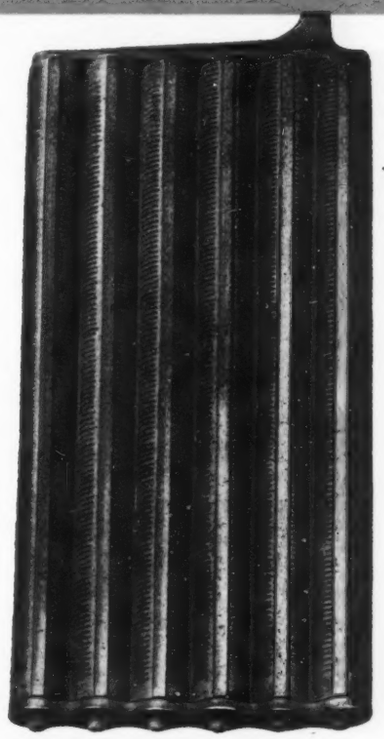
1934 Models Now Ready for Delivery

Write now for quotations to fit your needs

This new Wheat Lamp gives a miner the most light per shift of any cap lamp now on the market; this statement applying to both open and closed lights — carbide or electric.

It is suitable for any or all miners, in high or low coal, as its average weight is only *73 ozs.*

It is *smaller* than the original Wheat Lamp, yet it gives a beam of light *more powerful* than the famous Super Wheat.



In each cell of this new Model W Wheat Battery is used one only new style Ironclad Plate. The picture of this ironclad plate shows those pencil-like rubber tubes filled with active material, to which the electrolyte has access through the fine slots in the tubes.

KOEHLER MANUFACTURING Co., Marlboro, Mass.

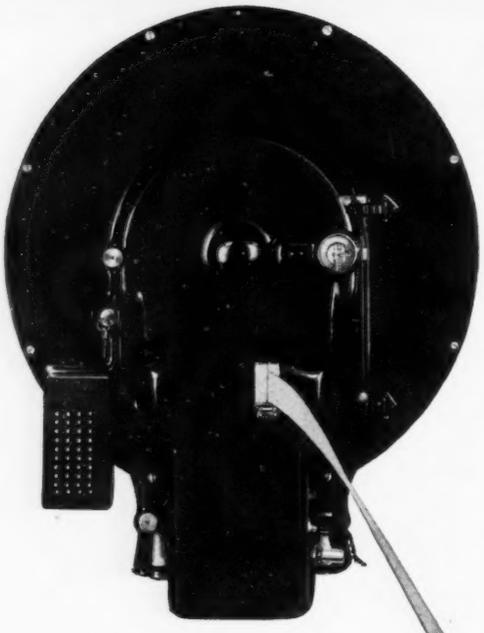
DISTRIBUTORS

Bituminous Coal Fields—Portable Lamp & Equipment Co., 405 Penn Ave., Pittsburgh, Pa.

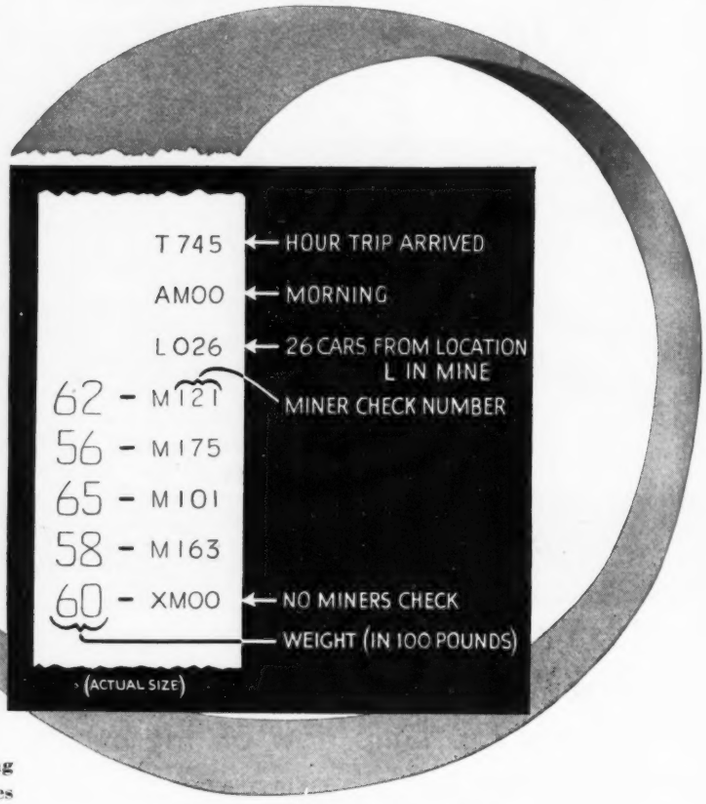
Pennsylvania Anthracite Coal Fields—G. A. Luckenbach, 1634 Jefferson Ave., Scranton, Pa.

TOLEDO MINE SCALES

2 ESSENTIALS for POSITIVE COAL WEIGHTS { 1. A DEPENDABLE SCALE . . . . 2. AN UNQUESTIONABLE RECORD



THE PRINTWEIGH

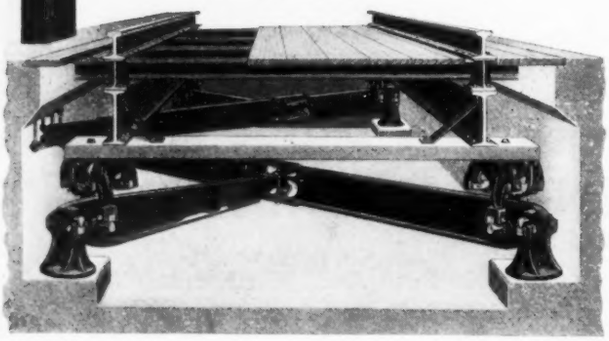


THE PRINTED RECORD

Weighing errors, repeated many times a day, are dangerous to mine operation. Overweight means large profit losses — underweight means frequent weight disputes. That's why a scale that is only "about right" is unsatisfactory for coal weighing. But an accurate scale alone is not enough to assure positive protection. Illegible handwritten figures which are easily misread, causing weight disputes, should be avoided. Toledo Mine Scales provide continuously accurate weighing *plus* a complete and unquestionable printed record.

The *Toledo Printweigh* automatically prints the weight of each car as it passes over the rails. It prints a single weight figure, 3/16″ high, that cannot be misread. No errors due to counting close graduations between figures. The danger of misreading indistinct handwritten figures is eliminated. In addition to the weight figure, other important information is recorded, such as miners' number, the time trip arrives at the tipple, number of cars in trip, the mine location where trip was loaded, mine delay, tipple delay, etc. This record is printed on a tape 1¼″ wide. Mine operator or miner read it alike.

THE SCALE



To make your weighing permanently dependable, you need all the rugged features of Toledo Mine Scales: Levers of cast semi-steel with 35% greater tensile strength than ordinary cast iron; Built with a large factor of safety to easily withstand shocks of heavy locomotives passing over the rails; Full-floating weigh bridge mounted on suspended bearings to eliminate wear on pivots and bearings due to vibration or oscillation; Pivots and bearings of tool steel (SAE-1095) and easily replaceable; Large hydraulic device to prevent vibration and shocks from being transmitted from rails to dial mechanism; Dust-protecting features for dial housing, pivots and bearings; An inbuilt, sealed unit weight for testing purposes. Only Toledo Mine Scales offer all these features for continuously accurate and trouble free weighing.

There's no shifting of responsibility for the scale and the printer with Toledo Mine Weighing Equipment. We supply both scale and Printweigh and guarantee the complete installation. Write for more information. Toledo Scale Company, Toledo, Ohio.

PREVENTABLE ACCIDENTS

cost the coal mining industry over

$80,000,000 *every year...*

What is your share of this tremendous expenditure?

Aside from the humanitarian considerations of saving lives and preventing painful injuries, there is no better investment in preventing the tremendous expense of compensation losses than the proper mine safety safeguards. In fact, a judicious investment in the proper protective devices pays its initial cost many times over.

Statistics reveal that while the national average cost of compensation is 27 cents per ton of production, many individual mine operators have cut this cost to an average of only 1.3 cents per ton by the use of approved Mine Safety Equipment—a startling figure but nevertheless true.

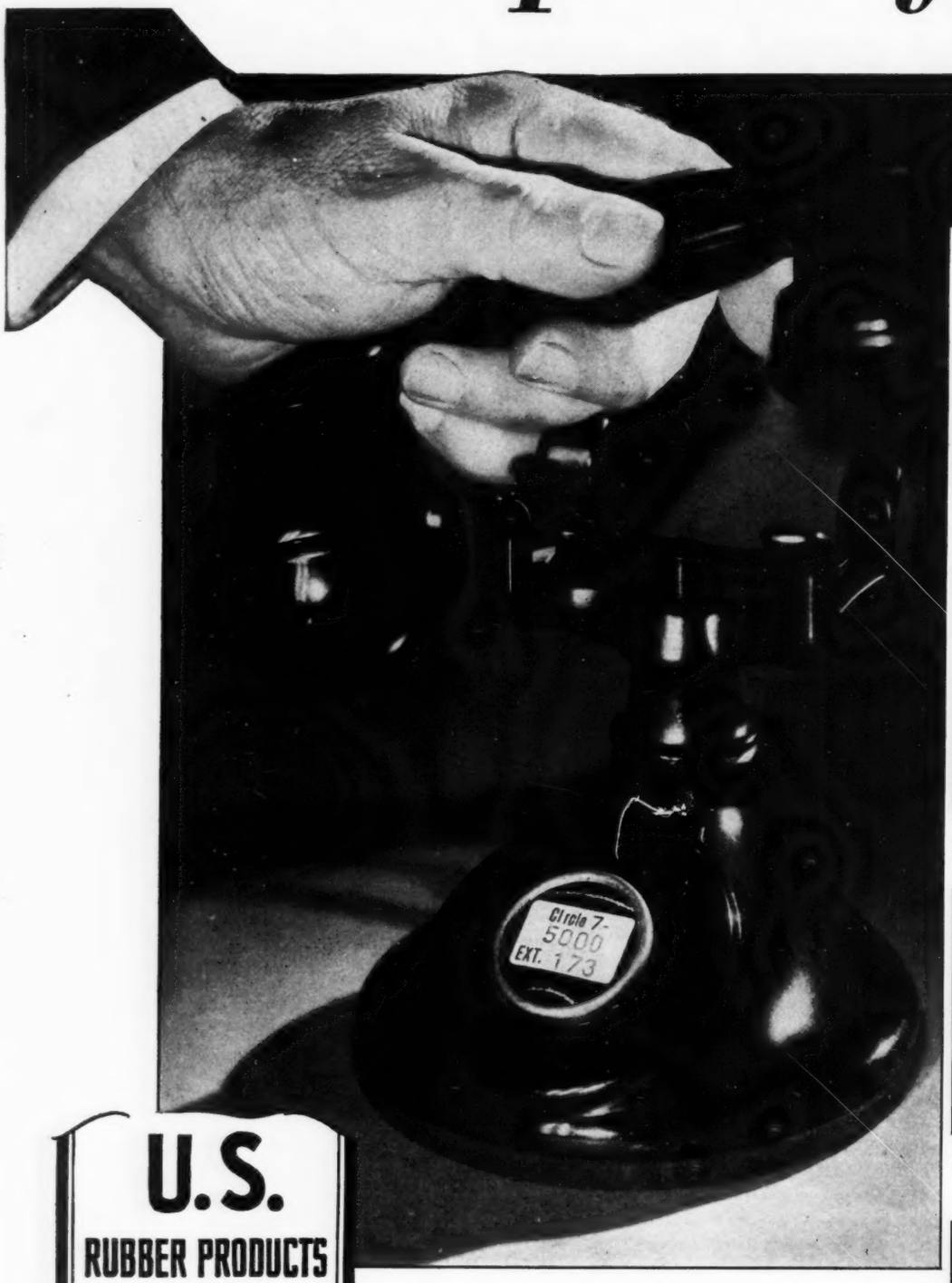
Every dollar saved in accidents adds just that much to the profit side of your ledger. So make MSA your headquarters for achieving this economy,—the world's largest commercial manufacturer of mine safety appliances of every description.

MINE SAFETY APPLIANCES COMPANY

General Offices: Pittsburgh, Pa.- District Representatives in Principal Cities

M. S. A. EQUIPMENT—Edison Electric Cap Lamps . . . Skullgards . . . Goggles . . . Safety Shoes . . . Rock Dust Distributors . . . Oxygen Breathing Apparatus . . . Self Rescuers . . . All-Service Masks . . . Gas Indicators and Recorders . . . Safety Clothing . . . Inhalators . . . First Aid Equipment . . . Safety Signs . . . Miscellaneous Mining Specialties . . . Descriptive Bulletins will be sent on request.

The Simplest of all



U.S.
RUBBER PRODUCTS
GIVE
THAT EXTRA
SERVICE

Tank Car and Acid Tank Linings, as well as linings for pipes, fittings, etc.

The "U. S." line of belting includes: Conveyor, Elevator, Transmission, Endless, Acid, Emery Polishing, etc.

Hose, from large diameter dredging sleeves to the smallest tubing.

From the famous "Rainbow" Sheet Packing to high and low pressure Rod and Valve Stem Packings.

NRA
U.S.
WE DO OUR PART

SPECIFICATIONS

Specify duck-weight, adhesion, tensile, elongation, gravity, burst–and you merely establish standards below which a product must not fall.

But those *extra* values above test or specification requirements, that are the fruit of long experience, supreme skill and a complete knowledge of service conditions and demands, are beyond the scope of the most rigid specifications.

Your only assurance of getting these plus values is in the selection of a manufacturer.

In the purchase of industrial rubber products your simplest–and safest–specification is . . . "Call U. S."

—United States Rubber Company—

1790 BROADWAY **NEW YORK CITY**

BRANCHES IN ALL INDUSTRIAL CENTERS

Powder *or* Cartridge-

You can pull it out but you can't put it back.

When the fuse is too short for easy lighting, it's too short for safety. The end should extend *well out* of the mouth of the bore hole when the primer cartridge or powder charge is in place.

The Ensign-Bickford Co.
Simsbury, Conn.

EXTRA FUSE IS

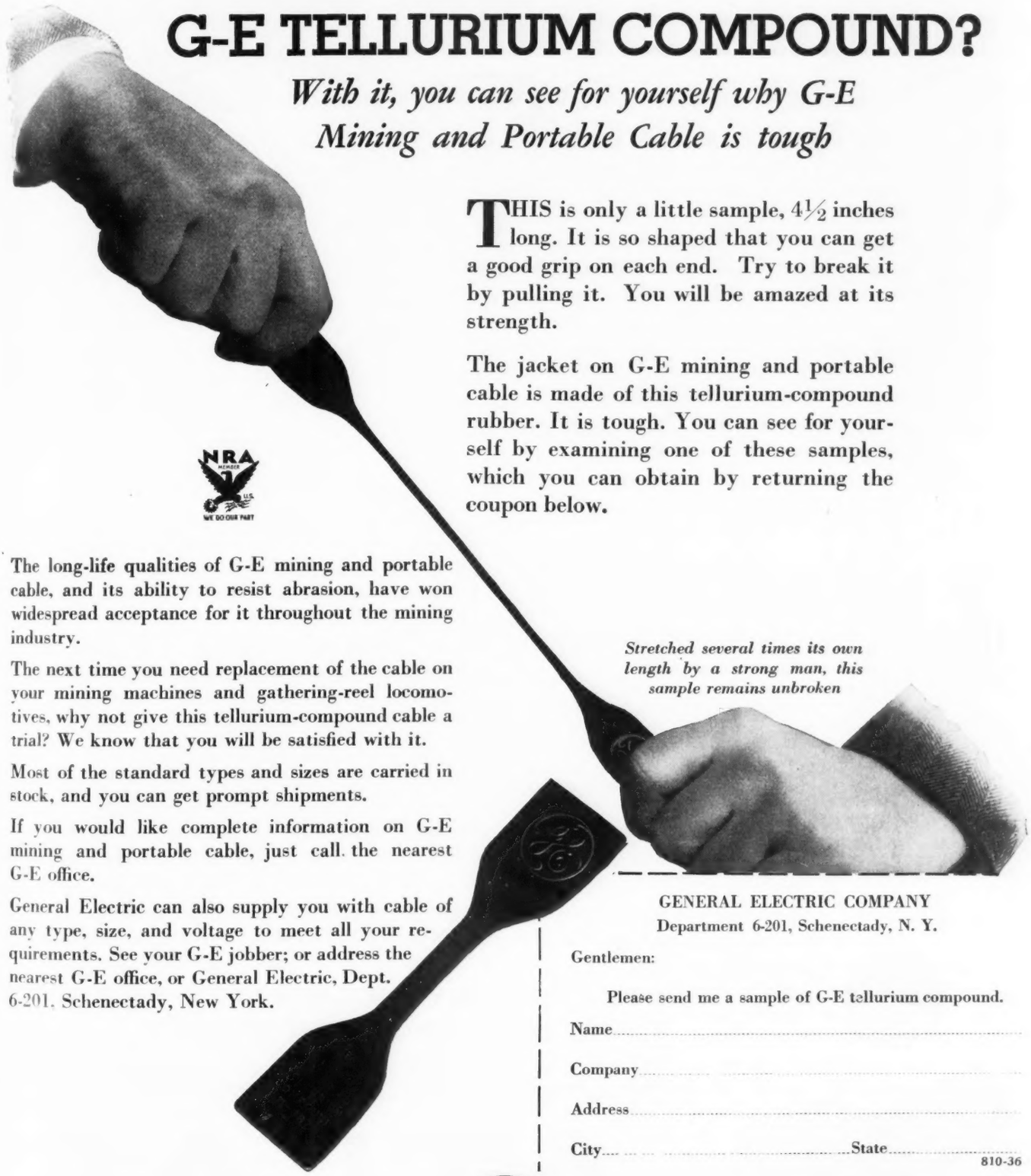
EXTRA SAFETY

SF-23

ENSIGN-BICKFORD SAFETY FUSE

Would You Like a SAMPLE of G-E TELLURIUM COMPOUND?

With it, you can see for yourself why G-E Mining and Portable Cable is tough



THIS is only a little sample, 4½ inches long. It is so shaped that you can get a good grip on each end. Try to break it by pulling it. You will be amazed at its strength.

The jacket on G-E mining and portable cable is made of this tellurium-compound rubber. It is tough. You can see for yourself by examining one of these samples, which you can obtain by returning the coupon below.

Stretched several times its own length by a strong man, this sample remains unbroken

The long-life qualities of G-E mining and portable cable, and its ability to resist abrasion, have won widespread acceptance for it throughout the mining industry.

The next time you need replacement of the cable on your mining machines and gathering-reel locomotives, why not give this tellurium-compound cable a trial? We know that you will be satisfied with it.

Most of the standard types and sizes are carried in stock, and you can get prompt shipments.

If you would like complete information on G-E mining and portable cable, just call the nearest G-E office.

General Electric can also supply you with cable of any type, size, and voltage to meet all your requirements. See your G-E jobber; or address the nearest G-E office, or General Electric, Dept. 6-201, Schenectady, New York.

GENERAL ELECTRIC COMPANY
Department 6-201, Schenectady, N. Y.

Gentlemen:

Please send me a sample of G-E tellurium compound.

Name.....

Company.....

Address.....

City..... State.....

810-36

GENERAL ELECTRIC

"I've read about them, and I'm all for the idea. Have you seen them?"

. . . a question blasters have been asking

"Have I *seen* them? Say . . . we've *standardized*-on ATLAS ELECTRIC BLASTING CAPS in the new ACCORDION FOLD Handy Package"

. . . so says one user

Until you've actually experienced their conveniences, advantages and economies you can't begin to appreciate the real value of the Atlas Accordion Fold method of packaging individual electric blasting caps.

Here is an exclusive Atlas feature as unusual—as unique as the electric blasting cap itself. Wires folded accordion-wise surround the cap to cushion and protect it—wires that show no annoying tendency to kink, to snarl, to waste your time and try your patience. The new package is handy to carry—easily opened—keeps wires folded accordion-wise to extend naturally into position—and permits easy priming.

You know the safety features—the uniformity, strength and dependability of Atlas Electric Blasting Caps. You'll be equally enthusiastic about the Atlas Accordion Fold Package!

ATLAS POWDER COMPANY · WILMINGTON, DELAWARE

A proper explosive for every blasting requirement

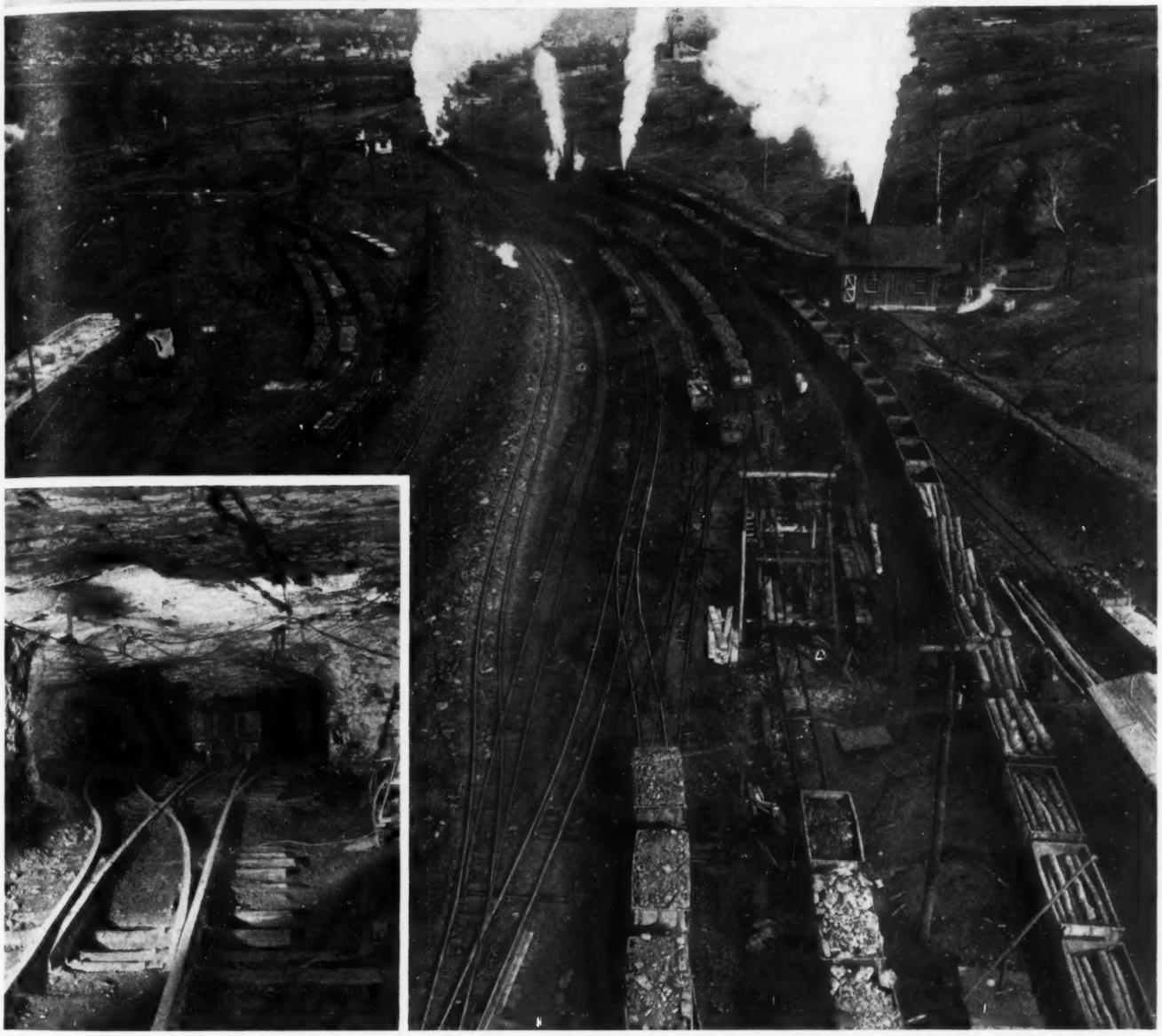
BRANCH OFFICES:

Allentown, Pa.; Boston, Mass.; Denver, Colo.; Houghton, Mich.; Joplin, Mo.; Kansas City, Mo.; Knoxville, Tenn.; Memphis, Tenn.; New Orleans, La.; New York, N. Y.; Norristown, Pa.; Philadelphia, Pa.; Pittsburg, Kans.; Pittsburgh, Pa.; St. Louis, Mo.; Tamaqua, Pa.; Wilkes-Barre, Pa.

PAT. APPLIED FOR

ATLAS EXPLOSIVES

GIVE YOUR *Modern* MINE



Modern TRACK EQUIPMENT

WHEN mine cars were hauled by mules, a derailment was nothing to get excited about. It merely slowed up an already slow transportation system. No wonder that in those days almost any kind of trackwork was good enough.

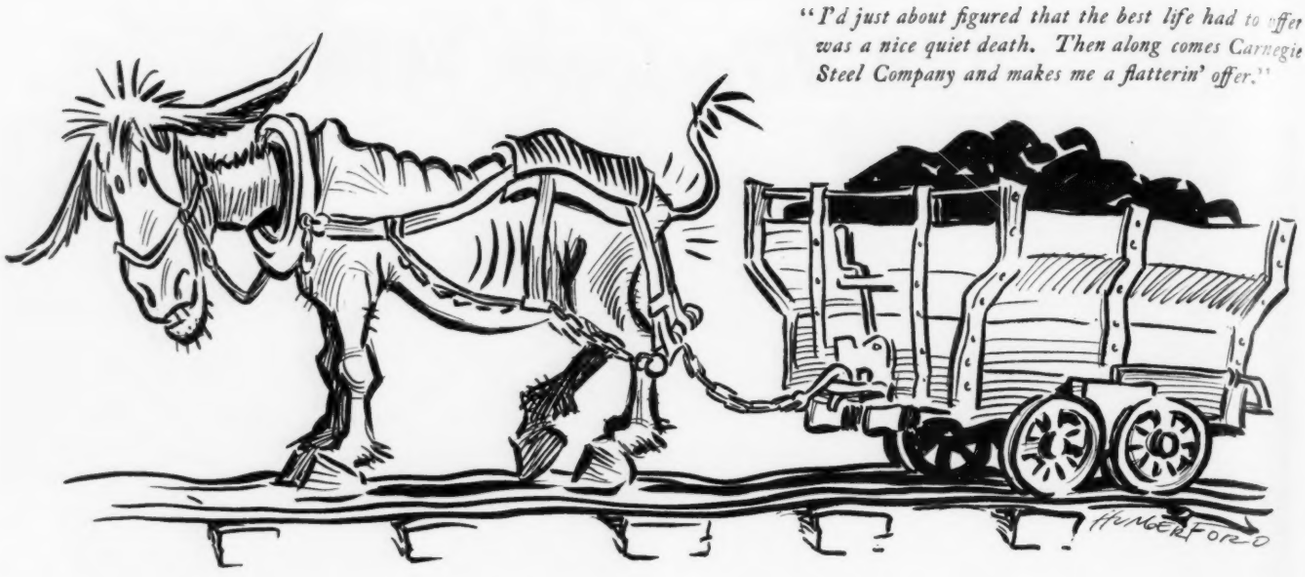
But in this day of mechanical haulage it's different. Derailments cost real money. A derailment in the modern mine means an intricate transportation system tied up, men and equipment idle, mine output seriously reduced.

The use of Bethlehem Track Equipment in your mine will be a long step toward eliminating derailments. This equipment is designed for haulage conditions in the modern mine. Its use will enable you to speed up haulage schedules, improve your transportation system from face to tipple, lower your production costs.

Every item of Bethlehem Track Equipment is substantially constructed, to high standards of material, design and workmanship, and reflects long experience in the manufacture of track equipment, for railways as well as for mines.

More and more, you see Bethlehem Track Equipment in the haulageways of the large, low-cost producers—Bethlehem Steel Ties, Light Rails, Turnouts, Frogs, Switches, Switch Stands, and Special Layouts—as well as Bethlehem All-Steel and Composite Mine Cars.

BETHLEHEM STEEL COMPANY, BETHLEHEM, PA.



"I'd just about figured that the best life had to offer was a nice quiet death. Then along comes Carnegie Steel Company and makes me a flatterin' offer."

Jerry...*the Colyumnist*

Life's funny, isn't it? After haulin' a coal car around year after year, I'd just about figured that the best life had to offer was a nice quiet death. Then along comes Carnegie Steel Company and makes me a flatterin' offer. Jerry, they says, won't you do a little writin' for us? What'll I write about, I asks. Oh, just be yourself, they replies!! And any good words you can work in about how swell Carnegie Products for coal mines is won't be held agin you. Well, bein' as how I can do that with a clear conscious, I accepts the job. So here I am, a public characature, appearin' in print and expressin' my opinions just like Will Rogers, Art Brisbane and all them other bright colyumnists. The only difference is that the papers has to be paid for the space to put my stuff in.

O'course it may take me a little while to get goin'. A coal mine's a good place for deep thought but not so good for writin' it out. One thing I've been thinkin' a lot about is how far behind the times so many coal mines is. If the automobile business was run the same way we'd still be wearin' linen dusters when we went for a ride and fixin' clincher tires. But the auto business kept on modernizin' and mechanizin' and pretty soon everybody was ridin' around in the lap of luxury for a triflin' sum. Except in the last couple years old man luxury walked out on us, his lap jus' faded away and he give us all a pretty bad bump. But he'll be settlin' down and gettin' comfortable again one of these days. Yes, sir, modernizin' makes money.

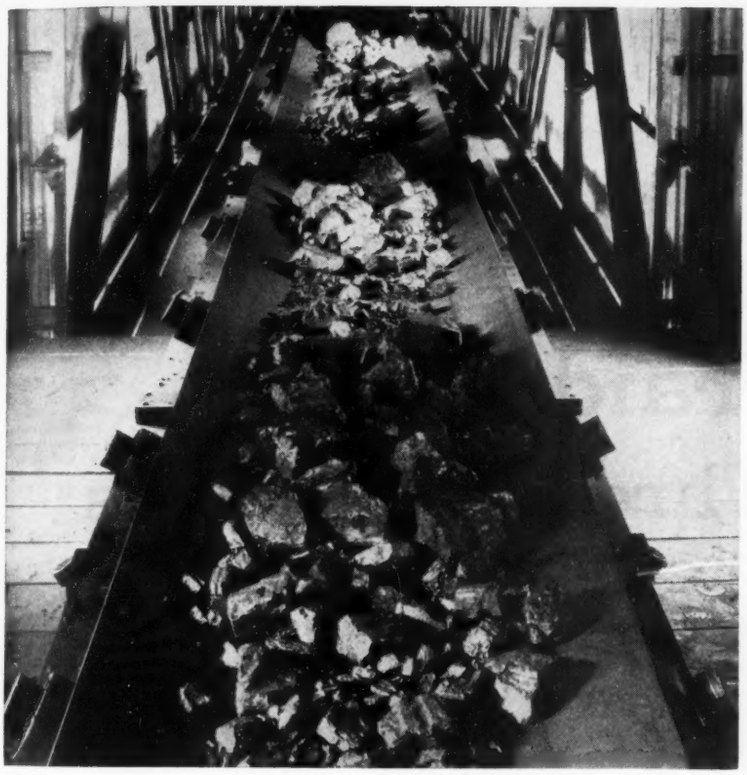
But here I've been writin' all this stuff and I haven't told you about my trip back to my old mine nor nothin' about Carnegie Mine Ties. Well, I'll hafta save that for the next time. S'long.

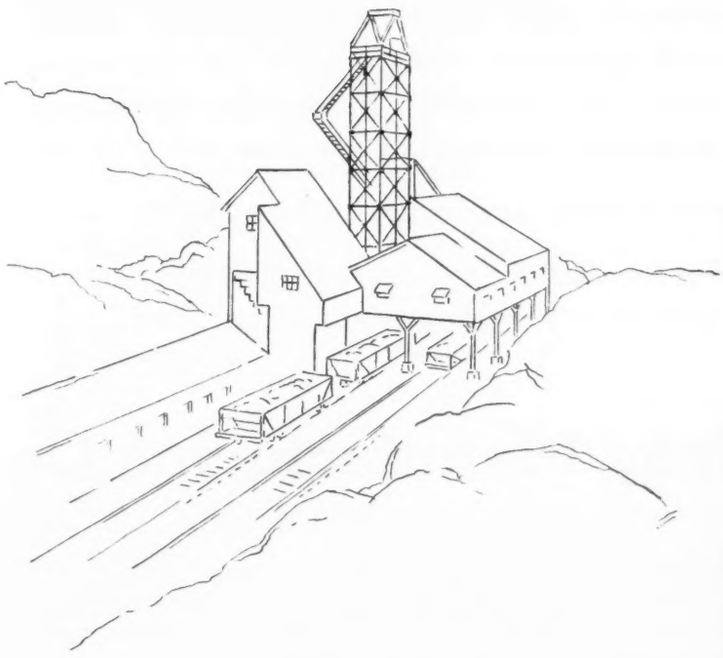
CARNEGIE STEEL COMPANY • PITTSBURGH

Subsidiary of United U·S STEEL *States Steel Corporation*

245

don't be "PENNY WISE"





REPUBLIC STEEL CORPORATION
GENERAL OFFICES — YOUNGSTOWN, OHIO

EVERY smart mine owner and operator knows that money invested in top-works plants is a capital investment that must pay dividends—and that a penny-wise policy of using anything but the best sheets for roofing and siding is likely to prove tragic.

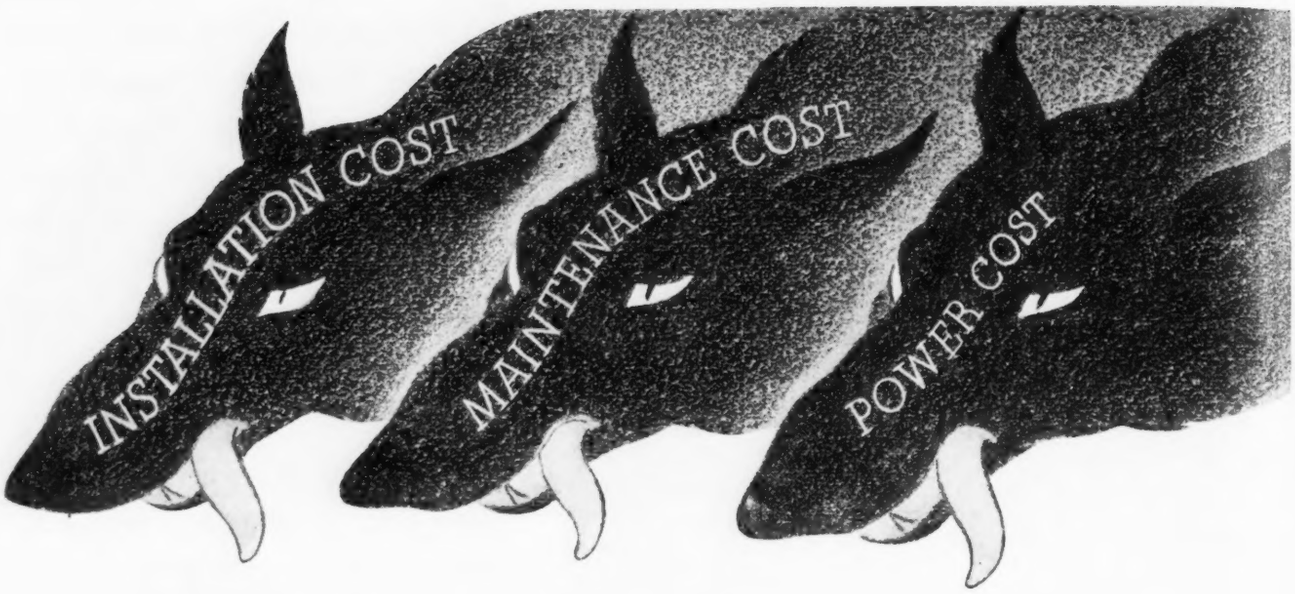
Toncan Iron has been doing a real job for mine owners and operators for twenty-five years—outlasting metals only slightly cheaper in first cost, and costing in the last analysis far less per year of service.

Toncan Iron is a modern alloy of refined iron, copper and molybdenum. Among the ferrous metals it ranks first in resistance to rust, after the stainless alloys. It resists the attacks of moisture and of sulphur-laden air, and this resistance is uniform throughout the thickness of the metal.

When new plants are to be built or old ones rebuilt, don't be penny wise. Base your selection of the sheet metal on the known performance of Toncan Iron and save money.

Write today for a copy of "The Path to Permanence" and get all the facts.

REG. U.S. PAT. OFF.
TONCAN
COPPER
MO-LYB-DEN-UM
IRON



Who's Afraid of the Three Bad Wolves?

Not the User of a Jeffrey Aerovane Mine Fan. He has successfully repulsed their attack. He is already receiving dividends in reduced operating costs.

But how about you—are you sure that these three bad wolves are not eating into *your* profits?

You can eliminate them once and for all. The Jeffrey Aerovane, at a small investment, will give you *better ventilation at lower power cost.* In a terrifically competitive coal market it will *cut your operating expenses to a minimum.*

Pull the teeth of these three wolves—Do it NOW.

Our Aerovane Fan Bulletin No. 566 will show you how you can keep these pests from your door. Send for it.

The Jeffrey Manufacturing Co.

912-99 North Fourth St., Columbus, Ohio

BRANCH OFFICES:

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Philadelphia
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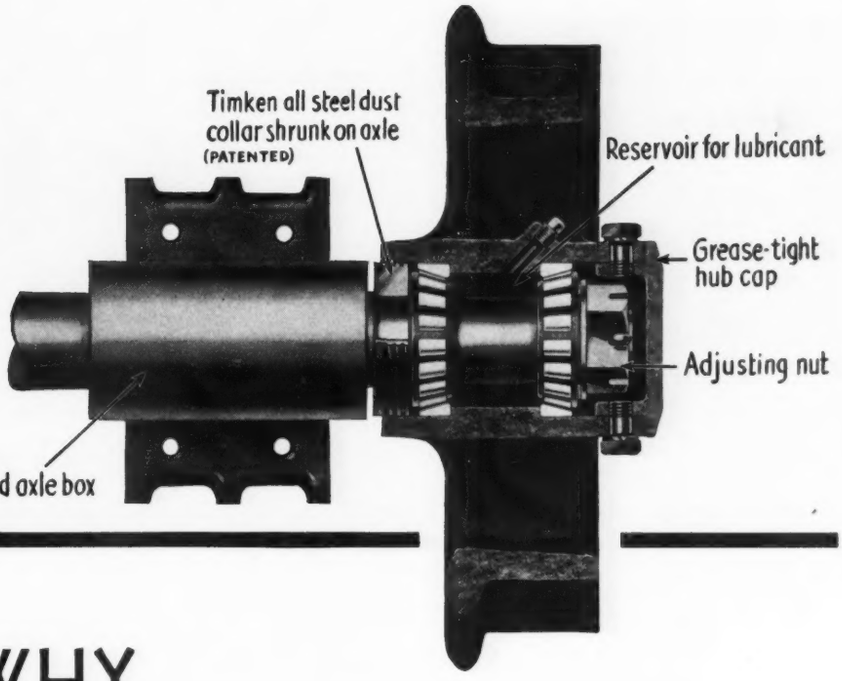
Jeffrey Manufacturing Co., Ltd., of Canada. *Head Office and Works,* Montreal; *Branch Office,* Toronto; *Service Station,* 210 Ninth Ave., W. Calgary


Timken all steel dust collar shrunk on axle (PATENTED)
Reservoir for lubricant
Grease-tight hub cap
Adjusting nut
Solid axle box

7 REASONS WHY TIMKEN IS THE DOMINANT MINE CAR BEARING

1 The Timken Tapered Roller Bearing embodies certain elements of design that are essential to maximum performance in mine car wheels, not found in other bearings. One of these important features is Timken positive roll alignment which prevents the rollers skewing both when in and out of the load zone. Another is the correct spacing of the rollers, with a truly perforated cage, preventing roller to roller contact and reducing internal friction to the vanishing point.

2 Timken Tapered Roller Bearings are made of Timken alloy steel, a special steel produced in Timken's own steel mill under the direct supervision and control of Timken metallurgists and engineers. This material is largely responsible for the greater load carrying capacity, endurance and long life of Timken Bearings.

3 The Timken Roller Bearing Company originated the tapered roller principle 35 years ago and has had more engineering experience in applying anti-friction bearings to mine cars than any other bearing manufacturer.

4 The Timken mine car bearing mounting includes an all-steel dust collar *shrunk-on* the axle—a patented feature developed for your benefit. This protects the bearing against the side-wise pounding of the loaded car, preventing it from being forced out of adjustment. The shrunk-on dust collar will not turn on the axle, thus eliminating the usual axle wear at the shoulder which would of course be disastrous to the bearing. It forms a permanent seal against the ingress of dust, grit and water and prevents the escape of lubricant. Make sure of getting this vital feature when buying bearings or cars.

5 Over 1,000 mine operators have proved the dependability and economy of Timken-equipped mine cars during years of profitable service.

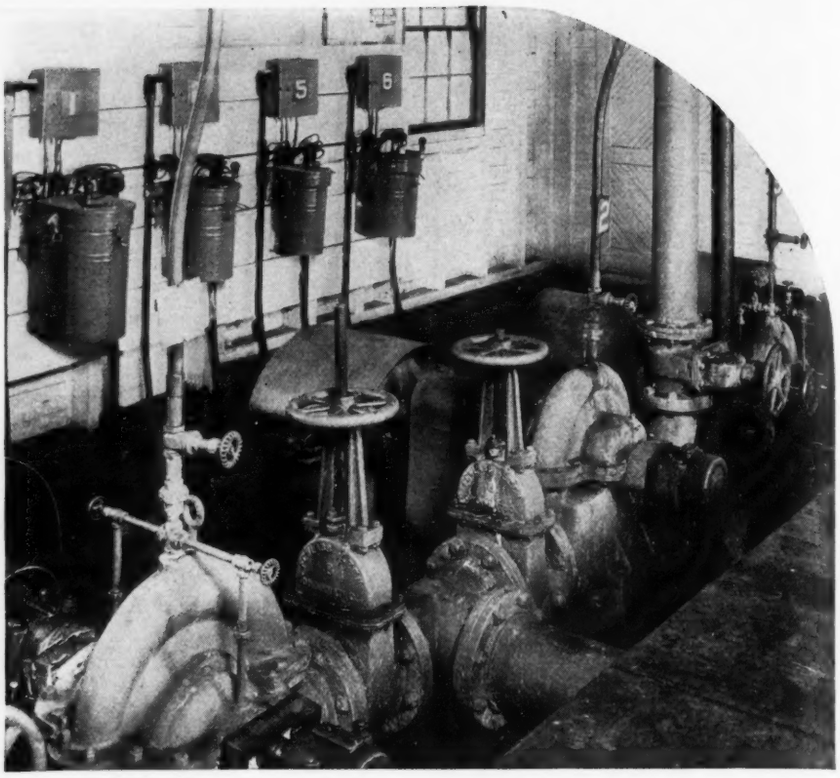
6 All the leading mine car builders install and recommend Timken Tapered Roller Bearings, because they know Timken is strong enough to stand back of each installation regardless of size.

7 The entire engineering, financial and manufacturing resources of the Timken Roller Bearing Company are behind every Timken Bearing that goes in a mine car to assure the operators satisfaction. Don't experiment; specify Timken-equipped—it pays.

THE TIMKEN ROLLER BEARING COMPANY, CANTON, OHIO

TIMKEN *Tapered Roller* BEARINGS

SKF EQUIPPED
BUILT BY
WORTHINGTON PUMP AND MACH. CORP.



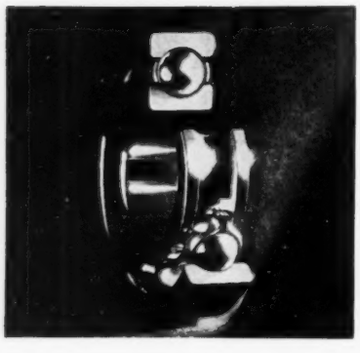
RELIABILITY OF MINE PUMPS WITH SKF

▼ ▼ ▼ ECONOMY

PUMPS... pumps... pumps everywhere in the mining industry ...and one thing they all must do... *make good on the job.* Nothing can take the place of reliability here. Intermittent or twenty-four hour service . . . pumps can't fall down from bearing trouble when protected by SKF performance.

SKF Ball Bearings do more than assure smooth, frictionless running of mine pumps. Ruggedness and long life are important characteristics of SKF's. And what's more, they show no wear, *need no adjustments.* Can't overlook this last feature... it's a big factor in maintaining initial clearances, and prolonging initial efficiency of pumps. Low upkeep rounds out the SKF Performance story and the reason why these bearings are preferred in an exacting industry for so many types of applications.

● *You may buy a bearing as a bargain but try and get a bargain out of using it, for nothing is apt to cost so much as a bearing that cost so little*



3129

SKF INDUSTRIES, INC., 40 EAST 34th STREET, NEW YORK, N. Y.

SKF

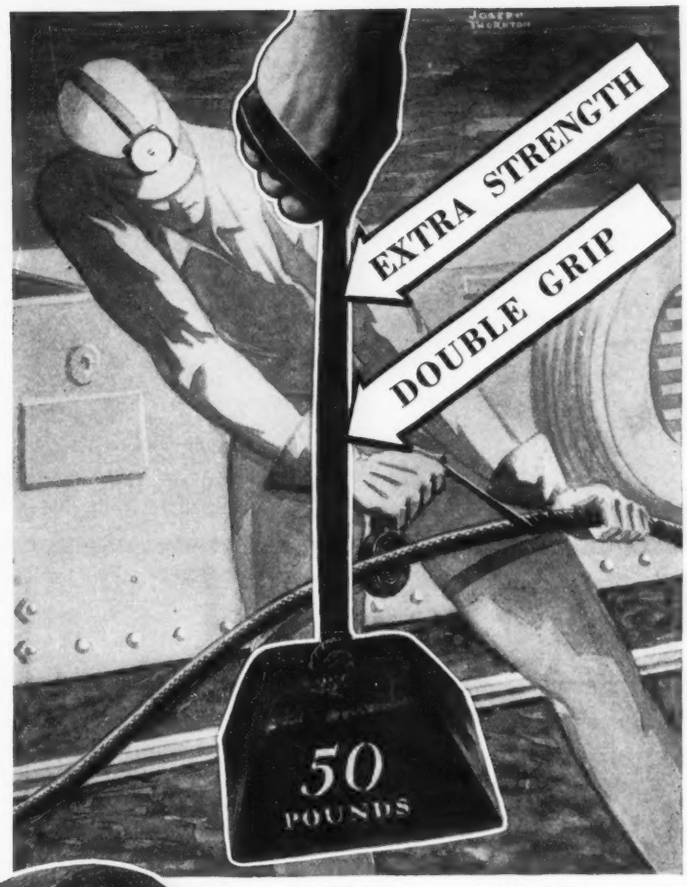
Ball and Roller Bearings

THIS STRENGTH TEST

shows why

RU-BER-OID TAPE

Keeps Down Power Losses



RU-BER-OID Tape exceeds the A.S.T.M., specifications—in adhesiveness by 300%, in tensil strength 26%, in dielectric strength 290%. Without laboratory equipment make this simple strength test. With 15 inches of RU-BER-OID Tape ¾-inch wide suspend a fifty pound weight. You will find the tape will not break.

YOUR electrical joints can have high maintained conductivity, if you use RU-BER-OID (formerly P & B) Insulating Tape.

The strength of RU-BER-OID Tape enables electricians and repair men to pull it hard enough on the joint to keep out air and dust. Its *two adhesive surfaces or double gripping power,* seals the copper contacts against oxidation and fowling from dirt, etc.

The strength and adhesiveness of RU-BER-OID Tape also keeps vibration from loosening the contacts, prevents heating, line losses and eventual break-down.

Test RU-BER-OID Tape on your toughest job. You, too, will find that its *extra strength and double grip*—will reduce maintenance costs and electrical circuit failures. Order several trial rolls of RU-BER-OID Tape today through your mine supply house.

RU-BER-OID COMPANION PRODUCT

RU-BER-OID Rapid Asphalt Paint (formerly P & B). A Quick Drying Insulator and Preservative—Used in the Coal Fields for Nearly 50 Years.

FEATURES

1. Since 1888 the quality of RU-BER-OID Tape (formerly P & B) has been maintained.
2. There has been no reduction made in the weight per square inch to increase the number of feet per pound.
3. One covering of RU-BER-OID Tape, due to its thickness, insulating quality and strength is sufficient.
4. Both surfaces of RU-BER-OID Tape are unusually adhesive. Regardless of climate or temperature it always stays put.
5. RU-BER-OID Tape may be stored without fear of deterioration. It will not dry out.
6. RU-BER-OID Tape is well known for its exceptional toughness and durability. It cannot ravel or pucker.

RU-BER-OID

INSULATING TAPE

(Formerly Marketed Under the Name P & B)

The RUBEROID Co.

Sales Divisions: RUBEROID MILLS
CONTINENTAL ROOFING MILLS—SAFEPACK MILLS—H. F. WATSON MILLS—ETERNIT MILLS
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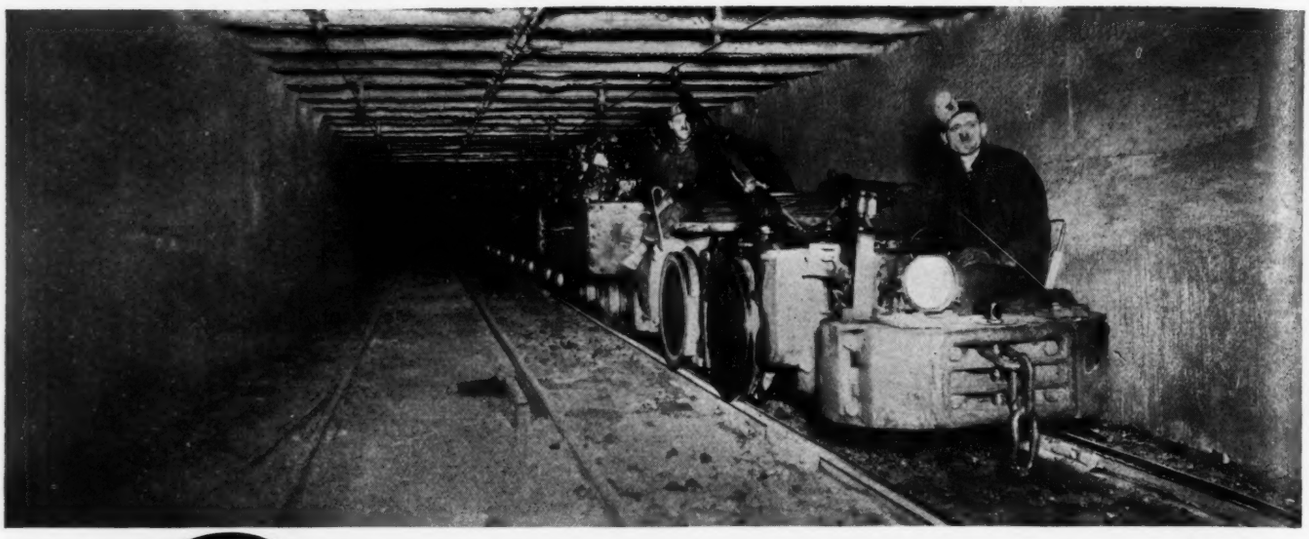


TIRES

The driving tires of the nation's fastest train—the locomotive wheels in the nation's largest coal and metal mines—standing up under spectacular speed or hauling phenomenal loads—are Midvale tires. Extra months and years of wear, yet at the same time standing the burden of heavy duty—there must be a reason for Midvale service.

The answer is simple. Midvale tires are made from super steel, actually tool steel. And Midvale tires are made in shops where, whatever the job, the men are required to maintain what they proudly call "Midvale quality."

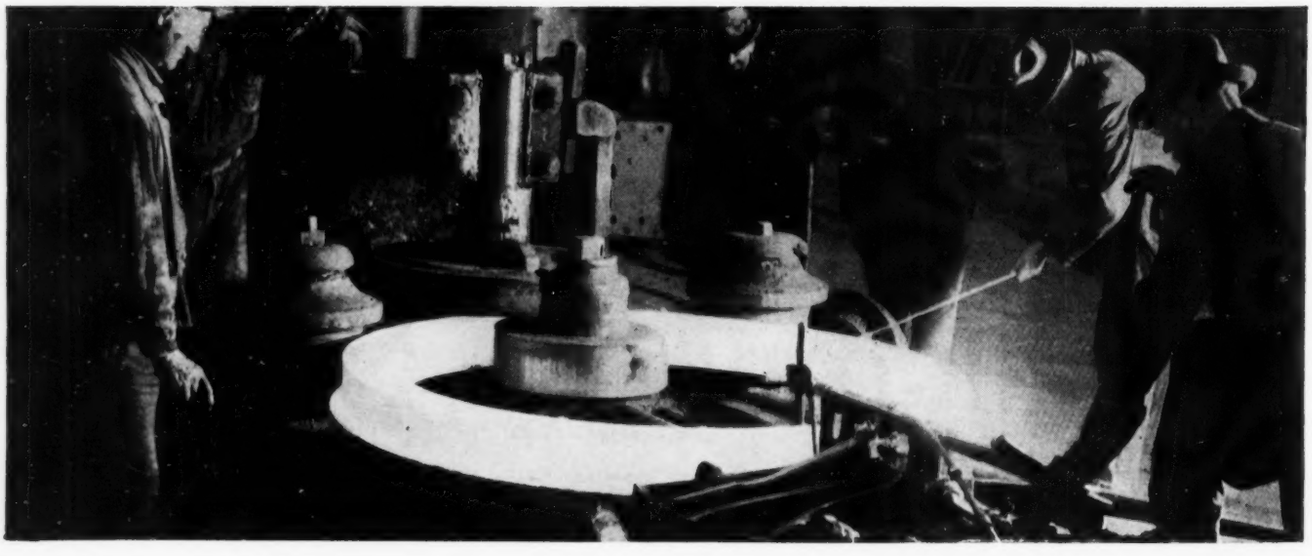
When you buy a tire you are not buying so many pounds of steel. You are buying so many years of service. On that basis you cannot purchase more economical tires than those by Midvale.

THE MIDVALE COMPANY • NICETOWN, PHILADELPHIA

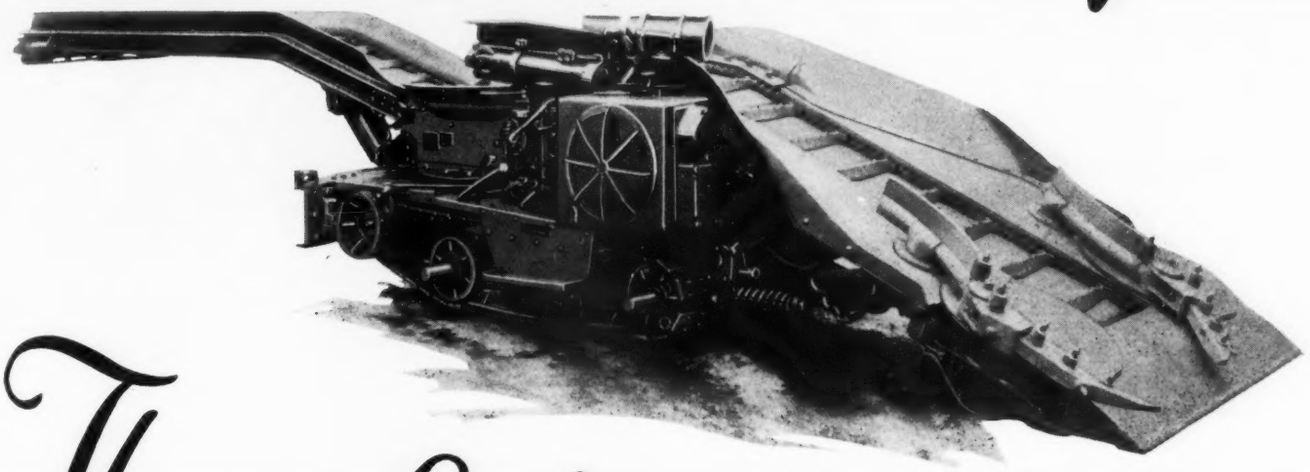
District Offices:

New York Pittsburgh Washington Cleveland Chicago San Francisco

by MIDVALE



JOY *Sets the pace*



The 5 BU *Loader*

FOR ADAPTABILITY
FOR ECONOMY
FOR SPEED

The Joy 5 B U was the first Joy unit to enter the mechanical loading field and proved itself in actual operation from the start.

Its mobility, speed of loading and adaptability to varying conditions soon attracted the attention of operators in all the bituminous coal producing states.

In the past 10 years, Joy has consistently loaded more coal than all other loaders combined in these fields. Joy has set the pace in tonnages loaded.

Certified costs of Joy users prove another significant fact—Joy has also set the pace in lowering operating costs.

● *Consult Joy engineers for facts and figures or ask them to show you what they can do on your operations.*

The JOY Manufacturing Company
FRANKLIN · · · · · · · · · PENNSYLVANIA

"Out

"Any man in the industry who doesn't read this paper is out of the running"

McGRAW-HILL PUBLICATIONS

American Machinist . . . for machinery and metal product manufacturers . . . business and technical magazine of the metal-working industries.

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Textile World . . . business and technical, edited generally for the textile industries, and specifically for each large division.

Transit Journal . . . engineering and business magazine of local transportation, electric cars, rapid transit, buses, trolley buses and taxicabs.

McGRAW-HILL PUBLISHING COMPANY, Inc.

of the running"—
without a business paper

At the opening session of a recent Mining Congress Convention, a Vice President of one of the world's largest coal mining companies held up a copy of COAL AGE and said: "Any man in the industry who doesn't read this paper is out of the running."

But COAL AGE is only one of many business publications. In *every* branch of business and industry leading executives will tell you the same story about their particular business paper. For the fact is that every man who doesn't read his business paper *is* "out of the running".

He's missing the industry's clearing house for ideas, its forum for discussions of mutual problems. He's missing the significant changes that present-day politics and economics are grooming for his industry.

He's missing ideas for new production economies, new materials, new equipment, new factory layouts, new maintenance kinks.

He's missing the progress in distribution—the new uses and new markets for products; new sales or merchandising ideas and new price policies.

He's missing important technical and scientific developments.

In short, he's missing news that can save him money. News that can help him keep in the van of his field. News that some day may wake him up with a jolt, to find that his company is "out of the running".

Put Your Company on a "Keep Alert" Program

Don't let your company get "out of the running". It's so easy to avoid, if you will follow this simple program:

1. Keep up with all the latest developments in your own profession, business or industry by reading regularly the leading paper in your particular field of endeavor.

2. See that your department heads read regularly publications pertaining to their own jobs, whether in management or operation, production or maintenance. (See list of Publications opposite.)

3. Ask to have a McGraw-Hill representative explain the various editorial features and services of the publications.

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Thousands of men are using this simple formula to keep in step with their jobs and their industries. They know how to *read* their business papers and apply what they've read to their own advantage and that of their companies. McGraw-Hill representatives are trained to show subscribers how to get the most out of business publications. A few hours of properly-planned reading each week will keep you and your staff posted on the progress in your field—will repay your company many times the cost and time involved. Mail the coupon today!

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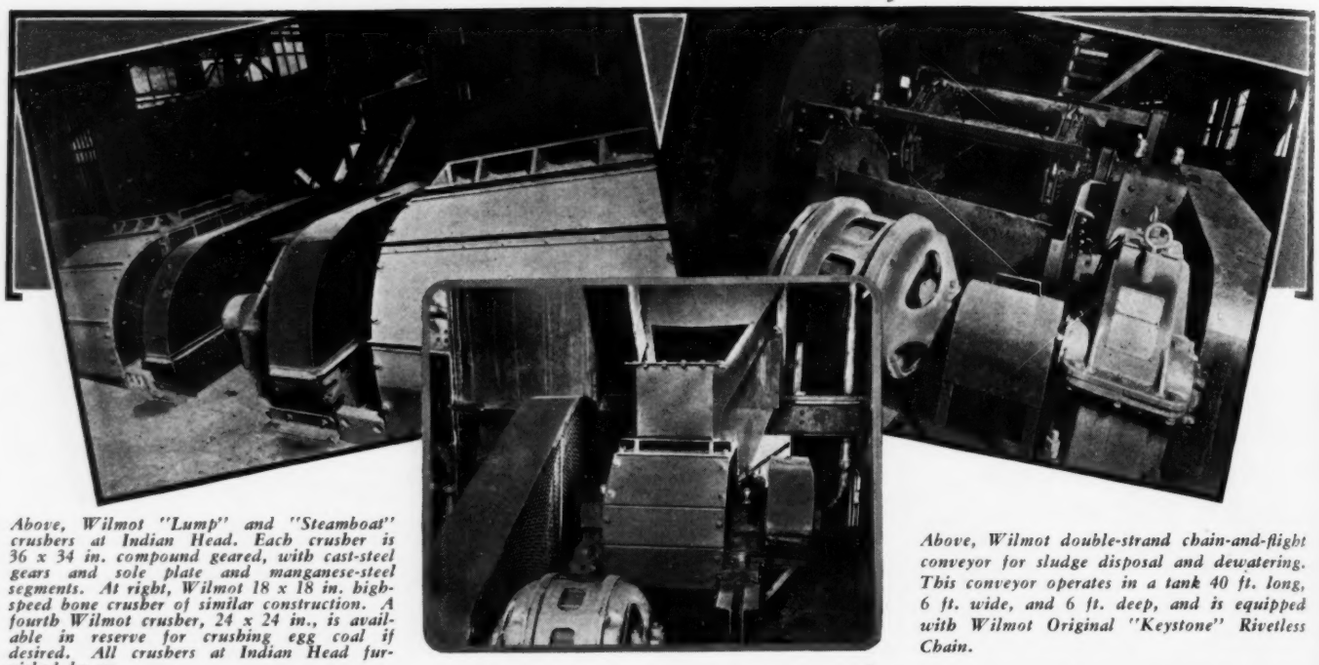


Above, Wilmot "Lump" and "Steamboat" crushers at Indian Head. Each crusher is 36 x 34 in. compound geared, with cast-steel gears and sole plate and manganese-steel segments. At right, Wilmot 18 x 18 in. high-speed bone crusher of similar construction. A fourth Wilmot crusher, 24 x 24 in., is available in reserve for crushing egg coal if desired. All crushers at Indian Head furnished by us.

Above, Wilmot double-strand chain-and-flight conveyor for sludge disposal and dewatering. This conveyor operates in a tank 40 ft. long, 6 ft. wide, and 6 ft. deep, and is equipped with Wilmot Original "Keystone" Rivetless Chain.

Time-tried Equipment in a New Preparation Plant

For more than 25 years Wilmot Equipment has led the way to increasingly higher standards of quality and economy in the preparation of both anthracite and bituminous coal. Wilmot equipment is well represented in the new preparation plant of Indian Head Anthracite, Inc. Besides furnishing all of the crushers, and the sludge-disposal conveyor illustrated above, we furnished the double-strand chain-and-flight conveyor that carries run-of-mine coal from the railroad-and-truck dumping stations to the bull shakers in the head house. This conveyor is 100 ft. between centers on a 37 degree pitch, and is designed to handle 175 tons per hour at a speed of 100 ft. per minute.

Write us regarding any present or prospective requirement in the preparation or handling of anthracite or bituminous coal. Constructive suggestions from Wilmot Engineers involve no charge or obligation.

WILMOT ENGINEERING CO., Hazleton, Penna.

Motor Drive Perfected with De Laval Worm Reduction Gear

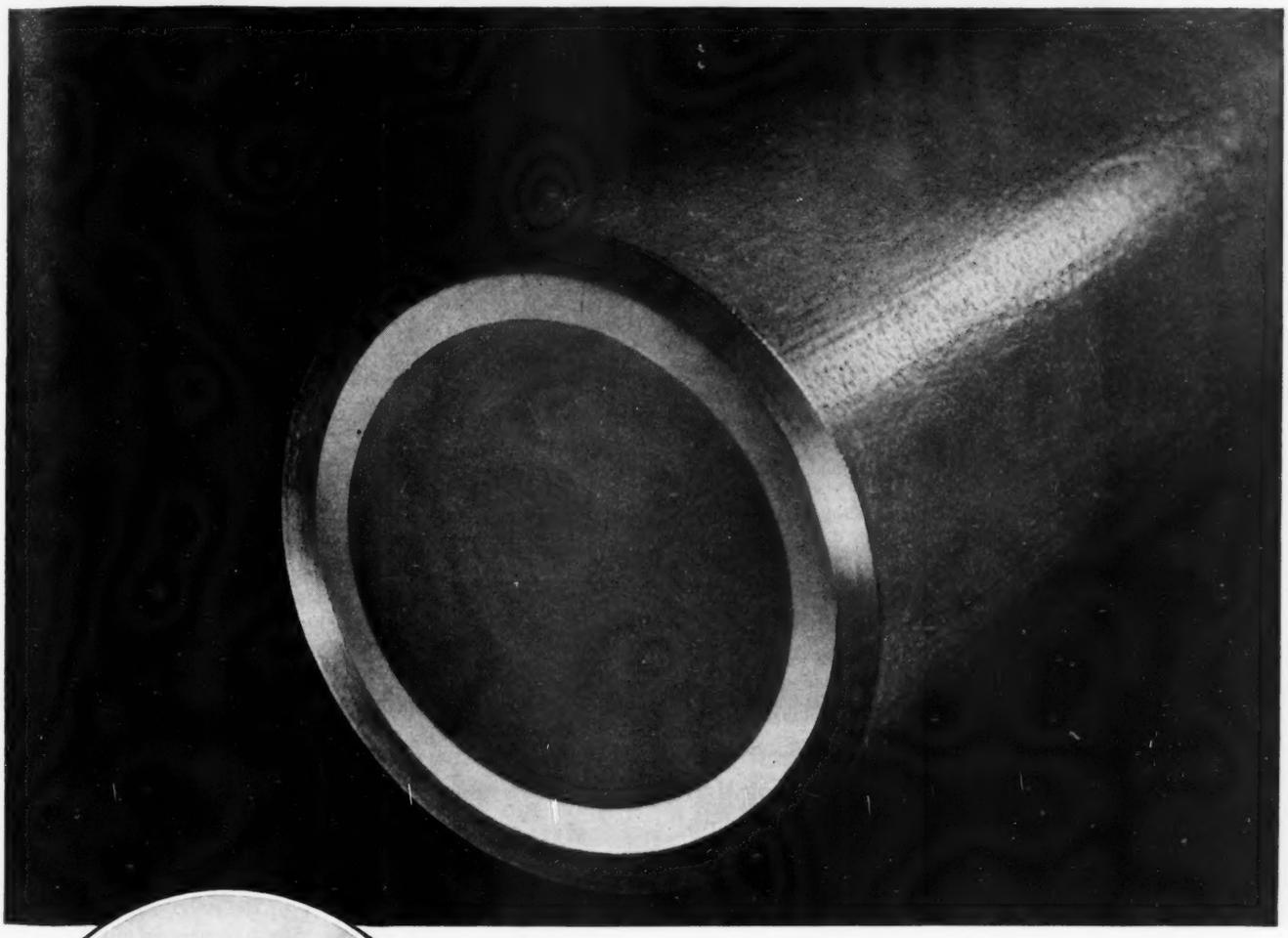
BY adopting this standardized, self-contained, self-lubricated speed transformer, the designer has achieved ruggedness and minimized the upkeep of his machine, to the great satisfaction of the user.

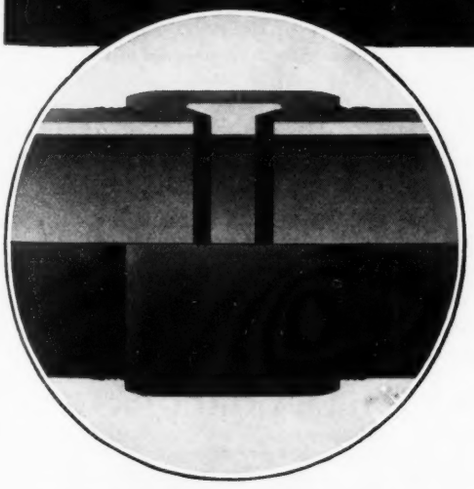
The photograph shows a Heyl & Patterson rock larry equipped with De Laval Worm Reduction Gear, at Carolina Mine No. 86 in the West Virginia Division of the Consolidation Coal Co.

DE LAVAL STEAM TURBINE CO.
TRENTON, N. J.

AD-1046

Now! A NEW PROTECTION FROM CORROSION
... and at a nominal cost!





Section of National DUROLINE Pipe coupling and joint. (Note special highly corrosion-resistant joint compound on end of pipe and on threads.)

DUROLINE is a highly-improved cement lining, developed primarily to resist the destructive action of waters and solutions that rust, corrode, or otherwise attack unprotected metal pipe.

DUROLINE Pipe, therefore, combines exceptional resistance to corrosion and tuberculation, with the strength, convenient joints, and other desirable features of steel pipe—and at a price that offers no handicap to its general use. It is particularly suitable for salt-water disposal systems and gathering lines; and for handling corrosive natural waters, mine drainage, chemical solutions, etc. A new bulletin describes in detail the development and proved serviceability of DUROLINE Pipe . . . Write for it!

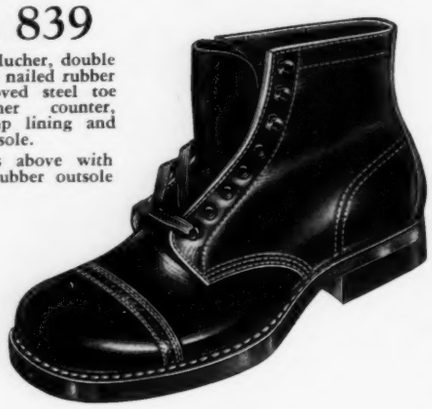
NATIONAL TUBE COMPANY · Pittsburgh, Pa.
Subsidiary of United States Steel Corporation

NATIONAL DUROLINE PIPE

No. 839

Black Elk Blucher, double oak sole, 13 nailed rubber heel, improved steel toe box, leather counter, leather vamp lining and grain inner sole.

No. 838 as above with army grid rubber outsole and heel.



The Steel Toe Box cuts compensation costs

Every mining executive knows of cases where broken and smashed toes could have been prevented by the use of Lehigh Safety Shoes with Steel Toe Box.

Perhaps, right now, you are paying compensation costs for one or more such needless injuries. The records show that thousands of dollars are being paid out every month by coal mining companies for just such preventable injuries.

Why tolerate such needless suffering and expense when Lehigh Safety Shoes with Improved Steel Toe Box cost no more.

Fill out the handy coupon and mail it in today. You owe it to your men, as well as to your company, to learn why Lehigh Safety Shoes cut compensation costs.

Lehigh Safety Shoe Company, Inc.

ALLENTOWN, PA.

Manufacturers, also, of All-Rubber Safety Footwear for underground service, together with many other types of safety shoes to meet every industrial requirement.

Gentlemen: I am interested in your model 839 safety shoe. Please send me prices and complete information—also samples on approval as checked below:

☐ 12 pair assorted SIZES.
☐ 1 pair, for personal use, SIZE .....

All orders sent C.O.D. unless credit has been established.

Name .....

Position or Title .....

Company .....

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THE folders, blotters, and other material illustrated above show just a few of the successful mediums through which dustproofing has pepped up the advertising and selling of coal. We'll be only too glad to help you put these selling messages to work right in your own territory doing a bang-up selling job for *your* coal. And they won't cost you a cent, either. We're ready and willing to help you sell because we know the dustproofing argument is a big help in making sales. You can make use of it in letters, newspaper ads, window displays, signs on your trucks, and in many other strong appeals to buyers.

Write today for full information. Ask for booklet 15161 and you'll get the full story.

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Calcium Chloride

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COMPANION TO THE COOL CAP

THE Ideal Head Protection for Wet Coal Mines . . . Has all the proved qualities of the widely used COOL CAP plus a Leather Brim to shed Water and Solid Particles from the Neck and Ears.

COOL HATS and COOL CAPS are now equipped with the New Flexible Ventilated Forehead Band, providing Head Comfort and Head Protection beyond all comparison!

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ANTHRACITE DISTRIBUTOR
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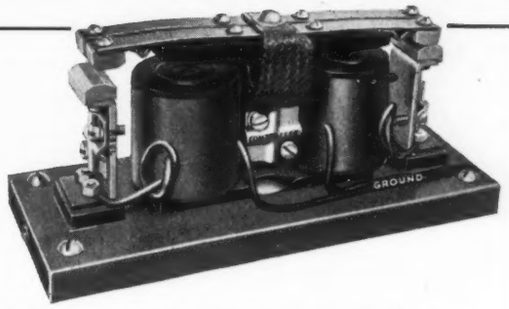
FOR SAFETY and ECONOMY use the P-G TRANSFER SWITCH



Important features

1. ABSOLUTE SAFETY—No shocks nor burns, while changing from trolley to reel or vice versa.
2. ENTIRELY AUTOMATIC—Easy to install. Can be mounted anywhere.
3. COMPACT—Single Switch, weighs 29 lbs. Overall dimensions 14 in. long, 5½ in. wide, 7¾ in. deep.
   Double switch weighs 54 lbs. Overall dimensions 14 in. long, 9½ in. wide, 7¾ in. deep.
4. DURABLE—will outlast several of the hand-operated switches.
5. 30 DAYS' TRIAL—You are the judge of worthwhile service.

When installed on your gathering locomotive it will lower maintenance cost—enable the operator to gather more cars—and do it with safety. Made for single trolley and reel or double trolley and reel 250 and 500 volts.

The P-G Transfer Switch shown here is an improvement over former models—it has larger coils providing positive contact even on low voltage—double contacts on each conductor—special clamps for ease of making connections to trolley-reel-and controller—rugged ebony wood base.

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Single Trolley and Reel
☐ 250 volts
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30 DAYS' FREE TRIAL

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Complete mines dismantled and sold.

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COAL MINING MACHINERY
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2—Jeffrey 10 ton, MH 78.
1—Goodman 13 ton, 36 B.
1—Westinghouse 13 ton, 908 C.
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1—Westinghouse 6 ton, 904 C.
3—Westinghouse 5 ton, 902 C.
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1—Goodman 8 ton, 33 T.
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1—Westinghouse 2200 A.C., 275 D.C., 200 kva.
1—Westinghouse 2200 A.C., 275 D.C., 150 kva.
1—General Electric 440 A.C., 275 D.C., 75 kva.

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2—Gen. Elect., Type HCC, 200 kva., 2200 A.C., 275 D.C.
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We also carry a large stock of A.C. and D.C. Motors, Electric Hoists, Transformers, Pumps and miscellaneous mining equipment.

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1—Brand new **30-B Goodman Gathering Locomotive,** 44-in. gauge.
3—13-ton **Whitcomb Trolley Pole Haulage Locomotives,** 250 volt. ball bearing motors, armorplate frame, 42-in. gauge, like new.
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4—**Jeffrey MH-88 6-ton Gathering Locomotives,** 42-in. gauge.
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6—Late type **5-BU Joy Loading Machines,** 250 volt D.C.
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4—**35-BB Mining Machines,** 250 volt D.C., excellent condition.
4—**Sullivan Portable Mine Air Compressors.**

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1—6-ton West., 250 v. D.C., 42-in. ga.
2—8-ton Bald. West., 250 v. D.C., 36-in. or 42-in. ga.
1—10-ton Jeffrey, 250 v. D.C., 36-in. ga.

MINING MACHINES

1—35B Jeffrey, 250 v. D.C., 42-in. ga.
4—Goodman, 250 v. D.C., 36-in. ga. Flameproof.
4—12 G-3 Goodman A.C., 220 v., 3 ph., 60 cy., 36 or 42-in. ga.
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Crusher (Hammer), Wms. No. 6 Jumbo	$1,000
Crushers (Hammer), Two, Penn. S-7. Each	450
Two Link-Belt 36-in.x48 Double Roll Coal Crushers. Cap. 200 tons per hr., Each	1,000
Goodman U/G Mining Shovel No. 48 Elect. Travel	3,500
Loco. Crane, Link-Belt Elect. 99 ft., 5-yd. Bucket	5,000
Clam Shell Bucket, 5-yd., separately	1,250
Thew Elect. Shovel, S/G, 4 wh., 1½ yd., 1 yd. Dipper	800
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Resistance bonder, very light, very simple, very neat, but very rugged, very good, and very cheap.

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2—6-ton Jeffrey Gathering Locomotives, with MH88 Ball Bearing Motors, 250 v.
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750 H.P. Lidgerwood Slope Hoist, Westgh., 2200/3/60 sl. rg. motor, air operated band friction and brake, automatic control. Rope capacity 9000 ft. of 1¼-in. rope.

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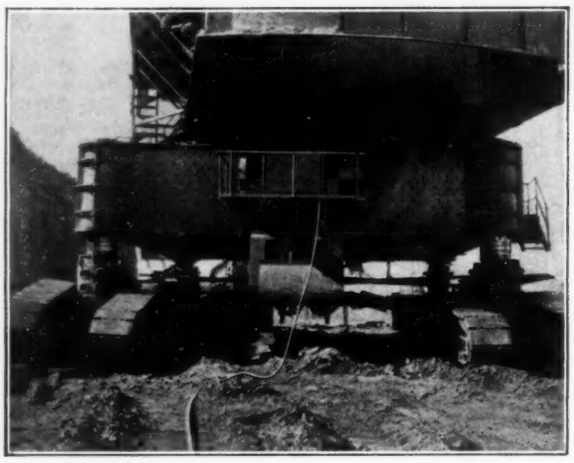

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Marion Shovels and TIREX Cables make a dependable combination.
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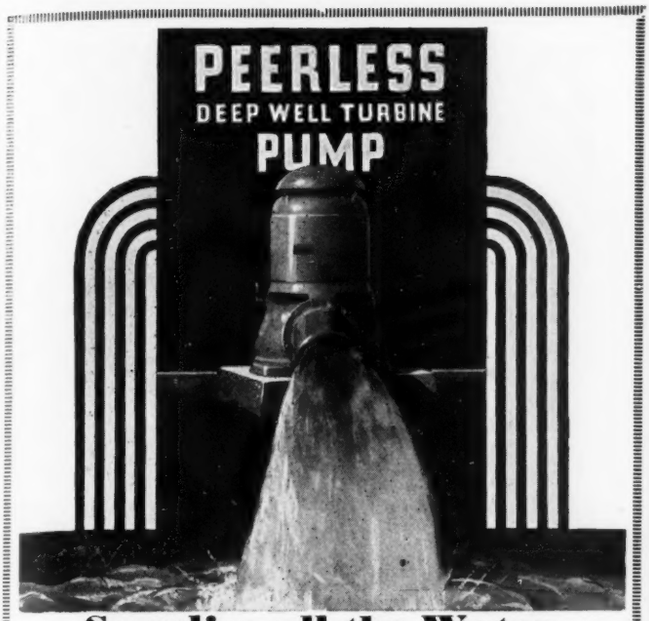

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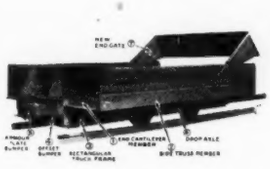
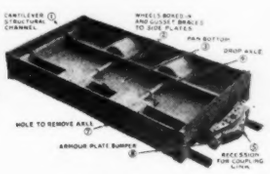


Whopper Saw-Tooth End-Dump



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Our Biggest Capacity Cars

Not only do these cars have large capacity, but they are Strong — Flexible — Simple — Easily Repaired and have No Unnecessary Weight, Rivets or Forgings.

On account of using the same "Cantilever" design in "Whoppers" and "Automatics" we have been able to standardize the construction and thus reduce unit cost.

To prove this statement to your satisfaction, compare our prices on a cubic foot basis.

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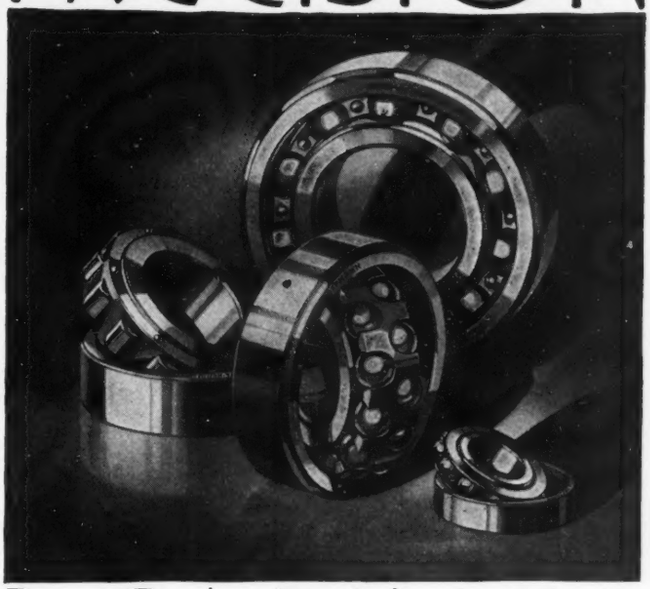

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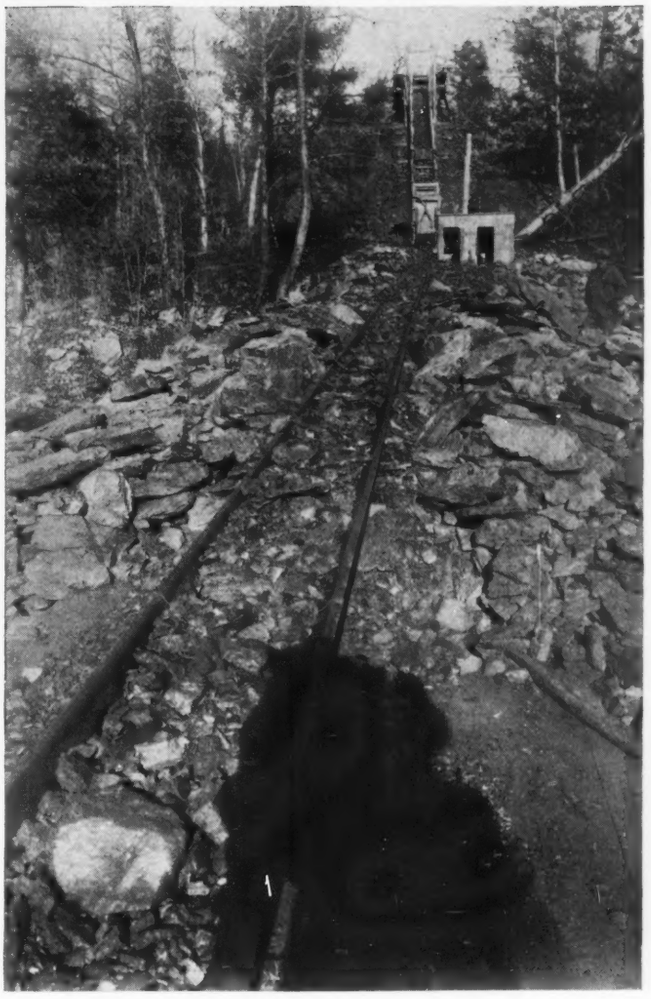

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